T.C.

ÇANAKKALE ONSEKİZ MART ÜNİVERSİTESİ

LİSANSÜSTÜ EĞİTİM ENSTİTÜSÜ

YÜKSEK LİSANS TEZİ

KORONAL KÜTLE ATIMLARINDAN SONRA GEZEGENLER ARASI ORTAMDA OLUŞAN ŞOK DALGALARININ ACE UYDUSU VERİLERİYLE İNCELENMESİ

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Tezin Sunulduğu Tarih: **28/01/2021**

Tez Danışmanı:
Prof. Dr. Hüseyin ÇAVUŞ

ÇANAKKALE

Gökhan ARAZ tarafından Prof. Dr. Hüseyin ÇAVUŞ yönetiminde hazırlanan ve **28/01/2021** tarihinde aşağıdaki jüri karşısında sunulan "**Koronal Kütle Atımlarından Sonra Gezegenler Arası Ortamda Oluşan Şok Dalgalarının ACE Uydusu Verileriyle İncelenmesi**" başlıklı çalışma, Çanakkale Onsekiz Mart Üniversitesi Lisansüstü Eğitim Enstitüsü **FizikAnabilim Dalı**'nda **YÜKSEK LİSANS TEZİ** olarak oy birliği ile kabul edilmiştir.

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Bu tezTürkiye Bilimsel ve Teknolojik Araştırma Kurumu(TÜBİTAK) tarafından desteklenmiştir. Proje Numarası: 117F336

İNTİHAL (AŞIRMA) BEYAN SAYFASI

Bu tezde görsel, işitsel ve yazılı biçimde sunulan tüm bilgi ve sonuçların akademik ve etik kurallara uyularak tarafımdan elde edildiğini, tez içinde yer alan ancak bu çalışmaya özgü olmayan tüm sonuç ve bilgileri tezde kaynak göstererek belirttiğimi beyan ederim.

Gökhan ARAZ

TEŞEKKÜR

Bu tezin oluşmasında, çalışmam boyunca benden bir an olsun yardımlarını esirgemeyen saygı değer danışman hocam Prof. Dr. Hüseyin ÇAVUŞ, çalışmamın her evresinde bana destek olan değerli aileme ve varlığıyla beni muazzam bir yaşam enerjisiyle dolduran biricik kızıma sonsuz teşekkürlerimi sunarım.

Gökhan ARAZ
Çanakkale, Ocak 2021

SİMGELER VE KISALTMALAR

n_{2ref}	Şok Sonrasının Yoğunluk Referans Değeri
V	Akışkan Hızı
P	Basınç
C_s	Ses Hızı
γ	Adyabatik indis
ρ	Yoğunluk
M	Mach Sayısı
μ	Dinamik Viskozite Katsayısı
Re	Reynolds Sayısı
κ	Sıkışma Oranı
S	Entropi
T	Sıcaklık
CME	Koronal Kütle Atımı
ACE	The Advanced Composition Explorer
AAVSO	AmericanAssociation of Variable Star Observers
τ_{ij}	Viskoz Stres Tensörü
V	Kontrol Hacmi
e	İç Enerji
σ_{ij}	Yüzey Normal Tensörü
Q	Isı
W	İş
Θ	Açı
St	Şiddet
St_{rel}	Göreli Şiddet

ÖZET

KORONAL KÜTLE ATIMLARINDAN SONRA GEZEGENLER ARASI ORTAMDA OLUŞAN ŞOK DALGALARININ ACE UYDUSU VERİLERİYLE İNCELENMESİ

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28/01/2021, 39

Gelişmiş Kompozisyon Gezgini (The Advanced Composition Explorer-ACE) uzay aracı, 1998-2014 yılları arasında 235 Güneş tabanlı gezegenler arası (IP) şok dalgalasını ölçmüştür. Bunlar 203 hızlı ileri (fast forward, FF), 6 yavaş ileri (slow forward, SF), 21 hızlı geri (fast reverse, FR) ve 5 yavaş geri (slow reverse, SR) tipi şoklardan oluşmaktadır. Bu veriler Harvard-Smithsonian Astrofizik Merkezi'nin gezegenler arası şok veritabanından elde edilebilir. Amerikan Değişken Yıldız gözlemcileri Birliği'nin (American Association of Variable Star Observers-AAVSO) Güneş Bölümü, Güneş lekelerini sayan bir organizasyondur. Şok dalgalarına bağlı olarak gezegenler arası ortam oluşan fiziksel parametre değişimleri ve Güneş lekesi değişimleri ile varyasyonları arasında bazı korelasyonlar olması beklenebilir. Bu tez çalışmasının iki adet amacı vardır. Birincisi, gezegenler arası ortamda oluşan ve ACE uydusu tarafından ölçülen Güneş kaynaklı şok dalgalarının bazı fiziksel parametreler üzerindeki etkilerini Çavuş (2013) tarafından yapılan hidrodinamik bir model kullanılarak hesaplanması iken ikinci amaç ise bu parametreler ile Güneş lekeleri arasındaki korelasyonu araştırmaktır.

Anahtar sözcükler: Güneş, Gezegenler Arası Ortam, Ace Uydusu , Koronal Kütle Atımı, Şok Dalgası, Viskozite, Güneş Lekesi

ABSTRACT

INVESTIGATION OF SHOCK WAVES IN THE INTERPLANETARY ENVIRONMENT AFTER CORONAL MASS EJECTIONS USING ACE SATELLITE DATA

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28/01/2021, 39

The Advanced Composition Explorer (ACE) spacecraft measured 235 sun-based interplanetary (IP) shockwaves between 1998 and 2014. These are 203 fast forward (fast forward, FF), 6 Slow forward (slow forward, SF), 21 fast reverse (fast reverse, FR) and 5 slow reverse (SR) type shocks. This data can be obtained from the interplanetary shock database of the Harvard-Smithsonian Center for Astrophysics. The solar division of the American Association of Variable Star Observers (AAVSO) is an organization that counts sunspots. There may be expected to be some correlations between physical parameter changes occurring in the interplanetary environment due to shockwaves, and variations between sunspot changes. This thesis has two objectives. The first is to calculate the effects of solar-induced shock waves formed in interplanetary environments and measured by the ACE satellite on some physical parameters using a hydrodynamic model by Çavuş (2013), while the second is to investigate the correlation between these parameters and sunspots.

Keywords: Sun, Interplanetary environment, Ace Satellite, Coronal Mass Ejection, Shock Wave, Viscosity, Sunspot

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BÖLÜM 1
GİRİŞ

1.1.Ana Hatlarıyla Güneş

Güneş, ortalama 11 yılda bir yüksek ve düşük manyetik aktivite süreleri ile karşı karşıya kalan manyetik olarak faal bir yıldızdır. Bu hareketli davranışı, sadece uyduların çalışmasına etki eden manyetik fırtınalar ortaya çıkarmakla kalmayıp, bununla beraber Dünya'nın uzun süreli iklim değişkenliğinde önemli bir paya sahip olan karasal çevreye mühim sonuçlar doğurmaktadır (Haigh, 2003).

Kütle çekimsel tesir, Güneş sisteminde en büyük gezegenlerden en ufak yıkıntı parçacıklarına kadar her şeyi yörüngesinde tutar. Güneş ve Dünya arasındaki irtibat ve etkileşimler kutup ışıklarını, radyasyon kemerlerini, iklimi, hava durumunu, mevsimleri ve okyanus akıntılarını yönlendirir. Bizim için özel olmasına rağmen, Samanyolu galaksisi Güneş'e benzer milyarlarca yıldızı içinde barındırır.

695.508 kilometre yarıçapı ile Güneş, makro bir yıldız değildir. Diğer çoğu yıldız bu sayıdan birkaç kat daha büyük bir yarıçapa sahiptir. Güneş, Dünya'dan çok daha büyüktür. Dünya, Güneş'in hacmine erişebilmek için 1.3 milyon kat daha büyük olmalıdır. Dünya ile Güneş'in uzaklığı 150 milyon kilometredir. Güneş'e ait bazı fiziksel parametrelerin değerleri aşağıdaki tabloda verilmektedir.

Tablo 1

Güneş'e ait bazı fiziksel parametreler(Gombosi, 1998)

Nicelik	Sembol	Değer	Birimi (SI)
Kütlesi	$M_\odot$	$1.99x10^{30}$	Kg
Yarıçapı	$R_\odot$	$6.96x10^{8}$	M
Ortalama yoğunluk	$P_\odot$	$1.41x10^{3}$	kg m^{-3}
Yüzey yerçekimi ivmesi	$g_\odot$	274	m s^{-2}
Yüzeyde kurtulma hızı	V_∞	618	km s^{-1}
Etkili…..sıcaklığı	T_{eff}	5,770	K
Parlaklık	$L_\odot$	$3.83x10^{26}$	W
Işıma akı yoğunluğu	$F_\odot$	$6.28x10^{7}$	Wm^{-2}
Güneş sabiti (1 AUyoğunlukta)	$f_\odot$	$1.36x10^{3}$	Wm^{-2}
Tipik ekvatoral manyetik alan kuvveti	B_{eq}	10^{-4}	T
Güneş lekelerinde manyetik alan kuvveti	B_{max}	0.25-0.35	T
Ekvatoral dönme süresi	$T_\odot$	26	Gün
Ekvatoral açısal hız	$\Omega_\odot$	$2.80x10^{-6}$	s^{-1}
Ekvatorun ekliptik eğimi		7	Derece

Güneş katı bir cisim olmadığından,farklı kısımları farklı sürelerde döner. Ekvatorda, Güneş her 25 günde bir etrafında döner, ama kutup noktalarında Güneş her 36 Dünya gününde kendi ekseninde bir kez döner (NASA, 2019).

Güneş'in katmanları iki grupta incelenir. Bunlar iç katmanlar ve atmosfer olarak adlandırılır.

1.2.Güneş'in İç Katmanları

1.2.1.Çekirdek

Güneş çekirdeği merkezden 0,2 Güneş yarıçapına dek uzanır. Özkütlesi $15x10^4 kg/m^3$ seviyelerinde, sıcaklığı da $13,6x10^6$ Kelvin civarındadır (yüzey sıcaklığı hemen hemen 5.800 K^odir) (Garcia ve ark., 2007). Güneş'in enerjisi, proton-proton zincirleme reaksiyonu olarak bilinen basamaklardan oluşan ve hidrojeni helyuma dönüştüren nükleer füzyon ile gerçekleşir.

Füzyon ile mühim seviyede ısı ortaya çıkarılan tek yer çekirdektir. Yıldızın arda kalan kısmı çekirdekten dışarıya doğru aktarılan enerji ile ısınır. Çekirdekte füzyonla oluşan tüm enerji art arda gelen tabakalardan geçip Güneş'e ulaşır ve buradan uzaya gün ışığı ve parçacıkların kinetik enerjisi olarak yayılır. (Garcia ve ark., 2007).

Çekirdeksel füzyon hızı, yoğunluk ve sıcaklıkla yakından ilişkilidir, bu yüzden çekirdekteki füzyon hızı otokontrollü bir dengeye sahiptir. Füzyonun hızı bir miktar yükseldiğinde çekirdek ısınıp dış tabakalara doğru çok hafif genişleyecek, ardından füzyon hızını azaltıp kendini düzenleyecektir. Nispeten düşük bir füzyon hızı da çekirdeğin soğumasına ve daralmasına, buna bağlı olarak da füzyon hızının artmasına sebep olacaktır.

Çekirdeksel füzyon tepkimeleri ile ortaya çıkan yüksek enerjili fotonlar Güneş plazmasının sadece birkaç milimetresi tarafından emilir ve yine rastgele yönlerde oldukça az enerji yitirerek yeniden yayılır. Işımanın Güneş'in yüzeyine ulaşmasının uzun sürmesi de bu sebeptendir. Fotonun bu yolculuğu 10^4ile $17x10^4$yıl kadar sürer (Mitalas ve Sills, 1992).

1.2.2.Işınımsal Bölge

Güneş ışınımsal bölge, en içteki çekirdek ile dış konvektif bölge arasındaki bölgedir. Bu bölgede, çekirdekte nükleer füzyon tarafından üretilen enerji elektromanyetik radyasyon olarak dışa doğru hareket eder. Enerji, ışınım bölgesi olarak bilinen Güneş tabakasından yayılmak için 10.000 yıldan fazla bir süre alarak yavaşça dışa doğru hareket eder.

Güneş'in ışınım bölgesi çekirdekten dışa doğru Güneş'in yarıçapının yaklaşık %70'ine kadar uzanır. Güneş'e göre daha az sıcak olan daha küçük bir yıldızda konvektif bölge, daha büyük olma eğilimindedir ve yıldızın iç kısmına dek uzanır. Bu sayede ışınımsal bölge daha küçük olma eğilimindedir. Konvektif bölge soğuk ve küçük yıldızlarda çekirdeğe kadar ulaşabilir ve hiç ışınımsal bölge olmayabilir. Diğerlerine oranla daha sıcak ve daha büyük bir yıldızda ışınımsal bölge daha büyük, konvektif bölge ise aksine daha küçük olma eğilimindedir. Güneşin iç kısımları (çekirdek ve ışınımsal bölge) dış katmanlardan (konvektif bölge) farklı şekilde döner. Işınım ve konvektif bölgeler arasında yer alan bu iki rotasyon türü arasındaki sınır, tachocline olarak adlandırılır (Russell, 2005).

1.2.3.Konvektif Bölge

Güneş'in iç yapısını oluşturan tabakaların en dışta olanıdır. Yaklaşık %30'luk bir bölgede yer alır. Derinliği yaklaşık 200.000 kilometredir. Konvektif bölgenin tabanında sıcaklık 10^6 K civarında iken; bölgenin ortalama yoğunluğu $2x10^4$ kg/m^3dir. Konvektif bölge Güneş hacminin %66'sını kapladığı halde, kütlesinin sadece %2'si kadardır. Güneş enerjisinin "ışınım yolu" ile değil; "konveksiyon" ile taşındığı bölgedir.

Konvektif bölge boyunca enerji taşınması, akışkan haldeki madde hareketleri ile gerçekleşir. Bu katmanın daha alt bölgelerinde ısınan akışkan yıldız maddesi genleşerek üst yüzeye yükselir. Katmanın alt tabanı ile üst yüzeyi arasındaki yüksek sıcaklık farkı sebebi ile yüzeye yaklaştıkça madde soğur. Soğuyan madde yeniden daha derin katmanlara doğru iner (Hansen ve ark., 2004).

1.3.Güneş Manyetik Alanının Oluşumu

Güneş bizim için ısı ve ışık kaynağıdır, yeryüzünde yaşamın devamlılığını sağlar. Enerjisi, iç kısmının derinliklerinde nükleer füzyondan gelir. Dünya ile benzer olarak, Güneş de yaklaşık 25 ile 36 gün aralığında bir kez kendi ekseni etrafında döner fakat Dünya'nın aksine, dönüşü tekdüze değildir. Kutup bölgeleri ekvator bölgesinden daha yavaş döner. Güneş'in özellikle hızındaki bu çeşitlilik manyetik burgulara sebebiyet vermektedir. Güneş ile ilgili araştırmalardaki temel bir fikir, Güneş'in yüzeysel hız farkının yanında, hacimsel olarak daaçısal dönüş hızı farklılıklarından dolayı manyetik bir dinamo oluşturarak, manyetik alan çizgilerinde burulmalar meydana geldiği ve Güneş'in gözlemlenen döngülerine sebep olduğu düşünülmesidir (Hanslmeier, 2004).

Yüklü parçacıkların hareketi sonucunda manyetik alanın oluşumu mekanizması dinamo etkisi olarak isimlendirilir. Dinamo teorisi; bir manyetik alanın oluşumuna ve sürdürülmesine etki eden, dönen, yayılan ve elektriksel iletim sağlayan birer akışkan

içerisindeki süreçleri tanımlar. Bu teori astrofiziksel cisimlerdeki anormal olarak uzun ömürlü manyetik alanların varlığını anlamak için kullanılır. Astrofiziksel cisimlerin dinamo teorisi, akışkanın nasıl sürekli manyetik alan üretebildiğini araştırmak için 'manyetohidrodinamik' denklemlerini kullanır (Taşkan, 2011).

1.4. Güneş Atmosferi

1.4.1. Fotosfer

Kelime anlamı 'ışık küre' dir. Fotosfer, Güneş'in radyasyonunun çoğunun dışarıya kaçtığı 500 kilometre kalınlığında bir bölgedir. Bu, gezegenlerin yüzeyleri gibi katı bir yüzey değildir. Fotosfer, bu gazlı yıldızın dış tabakasıdır. Güneş'ten koparak ortalama sekiz dakika sonra Dünya'ya vardığında fotosferden gelen ışınımı Güneş ışığı olarak görürüz. Fotosferin sıcaklığı yaklaşık 5.500 C^o derecedir. Fotosfer ayrıca Güneş lekelerini gözlemlediğimiz tabakadır. Bununla ilgili bilgi Güneş lekeleri başlığı altında ayrıca verilecektir (Strobel, 2004).

1.4.2. Kromosfer

Güneş tutulması esnasında karanlık Ay'ın kenarında ince pembe tabaka görülebilir. Pembe görülen bu katmana kromosfer denir. Sözcük anlamı "renk küresi" dir. Kromosfer sadece $2x10^3$ ile $3x10^3$ kilometre kalınlığındadır. Sıcaklığı fotosferden dışa artarak devam eder. Fiziksel olarak özelliklerinden sıcaklığı, fotosfer yüzeyine eşdeğer 4700 santigrat derece ile $25x10^3$santigrat derecedir. Özkütlesi ise $2x10^{-4}$ kg/m^3 ile $2x10^{-11}$ kg/m^3 aralığındadır. Korona ve fotosfer aralığında enerji-madde aktaran karışık bir plazma ve manyetik alan bölgesidir (NASA, 2017).

1.4.3. Korona

Güneş'in en dış atmosferi olan Korona, Güneş'in gözlemleyebildiğimiz yüzeyinin üstünde binlerce kilometreye uzanan ve yavaş yavaş Güneş sistemimizden dışa doğru ilerleyen Güneş rüzgarına dönüşen katmandır. Sıcaklıkların belirli oranda yükseldiği ince bir geçiş bölgesi, kromosferi yukarıdaki geniş koronadan ayırır. Güneş atmosferinin en dış kısmı korona olarak adlandırılır ve fotosferden daha yüksek bir oranda sıcaktır (UCAR, 2012).

Koronadaki plazma malzemesi oldukça düşük özkütleye ve yüksek bir sıcaklığa sahiptir. Koronadaki sıcaklık, fotosferdeki değer olan 5.500° C civarından oldukça yüksek bir değer olan10^{6o}C sahiptir. Dünya atmosferinden daha düşük bir özkütle ve basınca sahiptir. Korona, kromosferin hemen üstündedir. Geçiş bölgesi kromosfer ile koronayı birbirinden ayıran dar bir bölgedir. Bu alanda sıcaklık, kromosferdeki binlerce dereceden koronada bir milyondan fazla dereceye dek şaşırtıcı biçimde artar. Geçiş bölgesinde

yukarı yönlü yani kromosferden koronaya doğru ilerlersek plazma özkütlesinin hızla düştüğü gözlemlenir (UCAR, 2012).

Normalde korona da dahil olmak üzere Güneş atmosferini göremiyoruz. Güneş'in yüzeyi çok daha zayıf olan koronayı görmek için fazla parlaktır. Tam Güneş tutulması sırasında, ince korona, Ay Güneş yüzeyini bloke ettiği için ortaya çıkar. Koronagraf adı verilen özel bir alet, astronomların koronayı diğer zamanlarda görmelerini sağlar. Bazı koronagraflar yer tabanlı teleskoplarla kullanılır, diğerleri uydular üzerinde taşınır.

1.5.Koronal Kütle Atımları

Güneş, elektron ve iyonlardan meydana gelen hemen hemen iyonize olmuş yüksek sıcaklıklı gaz küresidir. Güneş'teki eylemler, kuvvetli manyetik bölgeler ile ona denk gelen elektrik akımlarını meydana getirir. Kuvvetli manyetik alanların bulunduğu bölgelerde, yüklü parçacıkların manyetik alan enerjileri kinetik enerjiye dönüşerek manyetik tekrar birleşmesi oluşur. Sıcak plazma Güneş yüzeyinden uzaklaşır. Güneş rüzgarındaki tedirginliklerden dolayı oluşan bu sıcak plazmanın kaynağı parlamalar ve koronal kütle atımlarıdır.

Korona içerisinde, manyetik alan çizgileri oldukça kuvvetlidir. Manyetik alan çizgiler Güneş yüzeyi üstünde gerçekleşen ani patlamalarla ortaya çıkarlar. Burada ivme kazanan Güneş plazması 618 kilometre/saniye hıza ulaştıktan sonra koronal kütle atımı gerçekleşir. Koronal kütle atımları 700-1000 kilometre/saniye hıza ulaşabilirler (Verma ve Sawant, H.S., 2004).

1.6.Koronal Kütle Atımlarından Sonra Oluşan Şok Dalgaları

Şok dalgaları, akışkan özelliklerinin bir denge durumundan diğer bir denge durumuna dönüştüğü geçiş katmanlarıdır (Priest, 2000). Şok dalgası basıncın arttığı neredeyse patlayıcı bir sıkıştırma işlemidir (Anderson, 1984). Fiziksel olarak, bir şok dalgası boyunca akış adyabatiktir. Şok cephesi, akışkan özelliklerinin (örneğin yoğunluk) şok öncesi değerlerden şok sonrası değerlere değiştiği geçiş bölgesidir. Şok dalgaları enerjiye sahiptir. Bir ortamda yayılabilir, fakat ortamın ani, neredeyse süreksiz bir şekilde değişmesi, basınç, sıcaklık ve yoğunluğun değişmesi ile karakterize edilir (Anderson, 1984). Bir şok dalgası maddeden geçtiğinde, enerji korunur ancak entropi artar. Maddenin özelliklerindeki bu değişiklik kendini iş olarak çıkarılabilen enerjide bir azalma ve süpersonik nesneler üzerinde sürükleme kuvveti olarak gösterir; şok dalgaları büyük ölçüde geri dönüşümsüz süreçlerdir (Shapiro, 1953).

Şok dalgalarının özellikleri aşağıdaki gibidir;

- Tersine çevrilemez ve boyuna mekanik dalgalardır

- Sıkıştırılabilir ortamdaki gazı birdenbire hızlandırır, ısıtır ve sıkıştırır
- Yaklaşık 10^{-5} cm kalınlığındadır.

Şok süreçleri, aşağıdakiler için çeşitli astrofiziksel durumlarda doğal olarak ortaya çıkabilmektedir. Süpernova patlamaları, fotoiyonize gaz, yıldız rüzgarları, yıldızlararası gazın yüksek hız kümeleri arasındaki çarpışmalar, iki veya birkaç galaksinin çarpışmaları vb. (Anand, 2012).

1.7.ACE Uydusu

Gelişmiş Kompozisyon Gezgini (Advance Composition Explorer-ACE), Güneş rüzgar iyonlarından galaktik kozmik ışınlara kadar enerji aralığını kapsayan Güneş kökenli parçacıkları gözlemleyen bir görev uydusudur. Verileri bugünün uzay hava tahminlerinin önemli bir parçasıdır. Gelişmiş Kompozisyon Gezgini, Güneş rüzgar enerjilerinden galaktik kozmik ışın enerjilerine H'den Ni'ye (Z=1'den Z=28'e) çekirdeklerin element, izotopları ve iyonik şarj durumu bileşimini ölçen altı yüksek çözünürlüklü spektrometre taşıyan ve 25 Ağustos 1997'de görevine başlayan araştırma uydusudur. Bu tarihte ACE, Cape Canaveral hava istasyonundan Delta II roketi ile başarıyla gönderilmiştir. ACE'ten elde edilen veriler, Güneş koronasının, yakındaki yıldızlararası ortamın ve galaksinin elemental ve izotop bileşimini ölçmek, karşılaştırmak ve çok çeşitli ortamlarda meydana gelen parçacık hızlanma süreçlerini incelemek için kullanılmaktadır. ACE ayrıca, gezegenler arası ortamın durumunu izleyerek iyon kompozisyon çalışmaları için heliosferik bağlam sağlayan üç araç da taşır. ACE, uzay hava tahmininde kullanılmak üzere NOAA'ya gerçek zamanlı Güneş rüzgarı ölçümleri de sağlar (Russell ve Mewaldt, 2012).

ACE üzerinde ölçümleri sağlayacak dokuz cihazın özelliklerini özetlemek gerekirse bunlar aşağıdaki gibidir;

CRIS, yaklaşık 100 ila 600 MeV / nükleon enerji aralığında galaktik kozmik ışınların elementel ve izotopik kompozisyonunu ölçmek için tasarlanmış bir Kozmik Işın İzotop Spektrometresi'dir. CRIS, geniş alanlı silikon dedektörlerinin dört eş-hizalanmış yığınında duran enerjisel çekirdeklerin yörüngelerini izlemek için iki CCD (Charge Coupled Device) kamera tarafından görüntülenen sintilasyon yapan bir optik fiber yörünge sistemi kullanır. SIS, iki özdeş silikon detektörü yığını kullanarak 10 ila 100 MeV/nükleon enerjisel çekirdeklerinin elementel ve izotop kompozisyonunu ölçecek bir Güneş İzotop Spektrometresi'dir. Parçacık yörüngeleri, özel düşük güçlü VLSI (Very Large Scale Integration) devresi ile enstrümantasyonlu konuma duyarlı silikon şerit dedektörleri ile izlenir. SIS tarafından kapsanan enerji aralığı, büyük Güneş parçacık

olaylarında hızlanan geçici enerjik çekirdek akılarının yanı sıra anormal kozmik ışınlar ve düşük enerjili galaktik kozmik ışınları içerir.

ULEIS, 50 cm'lik bir uçuş yolu boyunca uçuş sürelerinin kesin ölçümlerini ve toplam kinetik enerjilerinin ölçümünü birleştirerek çekirdeklerin kütlesini ve kinetik enerjisini He'den Ni'ye ölçen bir Ultra Düşük Enerji İzotop Spektrometresi'dir. ULEIS'in kapsadığı enerji aralığı Güneş enerjili parçacıkları, gezegenler arası şoklarla hızlanan parçacıkları ve düşük enerjili anormal kozmik ışınları içerir.

SEPICA, 0,2 ila 3 MeV / nükleon şarj durumunu, kinetik enerjisini ve nükleer yükünü ölçmek için tasarlanmış bir Güneş Enerjisi Parçacık İyonik Şarj Analizörü'dür. SEPICA'nın çok yarıklı kolimatörüne giren parçacıkların ivme değerleri, 30 kV'a kadar yüksek voltajlar taşıyan altı set elektrot plakası arasında elektrostatik olarak saptırılır. SEPICA ayrıca ACR (Automatic Charging Relay) şarj durumlarının doğrudan ölçümlerini yapacaktır.

EPAM, dürtüsel Güneş patlamaları ve CME'ler (coronal mass ejections) ve CIR'ler (co-rotating interaction regions) ile ilişkili gezegenler arası şoklar tarafından hızlanan 0.03 ila 5 MeV ile elektronların ve iyonların dinamik davranışını karakterize etmek için tasarlanmış bir Elektron, Proton ve Alfa Monitörü'dür. EPAM, beş ayrı aperatürlü iki teleskop takımı içerir.

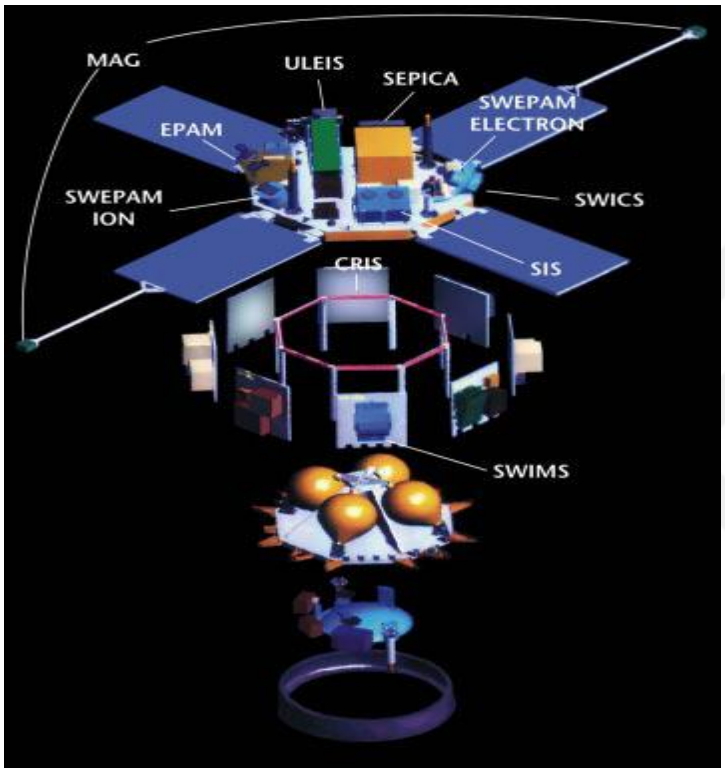
SWIMS, tüm Güneş rüzgar koşullarında Güneş rüzgarı izotop bileşimini ölçecek mükemmel kütle çözünürlüğüne sahip bir Güneş Rüzgarı İyon Kütle Spektrometresi'dir. Tasarım, Wind ve SOHO'daki benzer cihazlara dayanmaktadır. Kütle çözünürlüğü, uçuş sürelerinin kütle-yük oranının karekökü ile orantılı olduğu özel olarak tasarlanmış bir elektrostatik potansiyel aracılığıyla çekirdeklerin uçuş süresi ölçülerek elde edilir.

SWICS, elektrostatik sapma, ivme sonrası, uçuş süresi ve enerji ölçümlerinin bir kombinasyonunu kullanarak H'den Fe'ye tüm büyük Güneş rüzgar iyonlarının elementel ve iyonik yük durumu kompozisyonunu belirleyen bir Güneş Rüzgar İyon Kompozisyon Spektrometresi'dir. SWICS, Güneş rüzgarı toplama iyonlarının özelliklerini ölçmek için özellikle yararlıdır.

SWEPAM, 1 ila 900 eV arasındaki Güneş rüzgarı ve yüksek ısılı elektronların üç boyutlu özelliklerini ve 0,26 ila 35 keV arası iyonları ölçen bir Güneş Rüzgar Elektron, Proton ve Alfa Monitörü'dür.

MAG, gezegenler arası şokların, dalgaların ve enerjik parçacıkların hızlanmasını ve taşınmasını yöneten diğer özelliklerin ölçümleri de dahil olmak üzere vektör manyetik alanının dinamik davranışını ölçecek ikiz üç eksenli bir akı geçidi manyetometresidir.

Güneş rüzgâr protonlarının, alfa parçacıklarının ve elektronların ve gezegenler arası manyetik alanın yüksek kaliteli ölçümleri, 1 AU'daGüneş plazmasını koronadaki kökeniyle ve enerjik parçacık elektronu, proton ve alfa ile ilişkilendiren Güneş rüzgarı özelliklerini belirlemek için gereklidir. parçacık akıları, gezegenler arası ortamdaki geçici parçacık popülasyonlarını karakterize etmek için önemlidir. SWEPAM, EPAM ve MAG'den yapılan ölçümler, daha ağır çekirdek çalışmaları için gezegenler arası ortamı karakterize edecektir.



Şekil 1 ACE uydusu ve ölçüm araçları (Russell ve Mewaldt, 2012)

Giriş bölümünde belirtildiği gibi koronal kütle atımı Güneş aktivitesinin önemli bir olayıdır. Şok dalgalarına neden olabilirler. Güneş aktivitesinin Dünya ve yakın uzay çevresine etkileri bu tezde araştırma konusudur. Bu konu göz önüne alındığında tezin bundan sonraki bölümünde geçmişte yapılan benzer çalışmalara değinilecek.

BÖLÜM 2
ÖNCEKİ ÇALIŞMALAR

Güneş lekeleri ile ilgili ilk çalışmalar Çinli astronomlar tarafından M.Ö. 350 yılı sonlarında kayıt altına alınmıştır. Teleskop yapımı ile düzenli biçimde gözlemlenmişlerdir. Güneş lekelerinin zamana bağlı şekilde meydana geldiği, farklılaştığı, yok olduğu ve yeniden meydana geldiği görülmüştür. Güneş lekelerinin yok olması ve ardından yeniden oluşması, Güneş'in kendine ait eksen üzerinde dönmesinin ve ait olduğu yapının farklılaştığının ispatıdır. Güneş lekelerinin düzenli farklılaşma ortaya koyduğunu ilk kez disiplinli bir biçimde inceleyen Rudolf Wolf olmuştur. Ayrıca 1716 yılında Güneş lekelerinin yaklaşık 70 yıl kadarlık periyotla farklılaştığını ileri süren Gustav Spörer'dir. Ardından Edward Walter Maunder Güneş konusundaki gelişmeler sayesinde Güneş lekelerinin düzenli biçimde farklılaştığını ve gözlemsel bilgiler ışığında bunların 1645 ile 1717 yılları arasında hemen hemen yok olduğunu literatüre kazandırmıştır. Bu süreç, Maunder Minimumu denilen, kutup ışıklarının yok olmasına da denk gelen ve Güneş'in yapısındaki hareketliliğin en az olduğu aralık demektir.

Güneş lekeleri miktarındaki değişiklikleri öncelikle Heinrich Schwabe incelemiştir ve 1844'te literatüre kazandırmıştır (Schwabe, 1844). 1848'de Joseph Henry, Güneş ve Güneş lekeleri arasında sıcaklık farkını ölçmüştür (Hellemans ve Bunch, 1988). Güneş'teki düzenli farklılaşma kısa, orta ve uzun vade biçiminde üç farklı şekilde gruplandırılmıştır. Kısa vadeli farklılaşma, aktif alanların ya da manyetik alanların değişimi demektir (Mursula ve Zieger, 1996; Ivanov ve Obridko, 2002; Nayar ve ark. , 2001, 2002).

Güneş lekelerinin sınıflandırma işlemi 1900 yılları başlarında Stonyhurst College Gözlemevi'nde gerçekleşen ve uzun yıllar devam eden gözlemler ile ulaşılan 3500 tane Güneş lekesi çizimine dayanmaktadır. Sınıflandırmayı gerçekleştiren Cortie (1901)'nin düşüncesi farklı hallerdeki Güneş leke gruplarını biçimsel olarak tanımlamak ve Güneş leke grubunun geçirdiği dönüşüm basamaklarını incelemekti (Cortie, 1901). Ayrıca bir de Zurich sınıflandırması vardır. Cortie'ye ait olan leke sınıflandırma işleminin Waldmeier (1938) tarafından geliştirilmesi sonucu açığa çıkmıştır. Ayrıca bilim otoriteleri tarafından sıkça kullanılan ve kabul gören sınıflandırma yöntemidir. Bu sınıflandırma Güneş leke gruplarının şekilsel ve yapısal dönüşüm basamaklarını tanımlamaktadır. Buradaki iki çeşit sınıflandırma işleminin de leke bölgeleri, Güneş patlamaları gibi diğer Güneş aktivite değerleriyle zayıf korelasyon sağlaması kullanılan iki sistemin tekrardan incelenmesini mecbur hale getirmiştir. Güneş leke sınıflandırmasındaki zayıflıklar McIntosh'un

çalışmaları ile var olan Zürih sınıflandırmasının geliştirilmesi sayesinde azaltılmıştır (McIntosh, 1990).

Güneş lekelerinin disiplinli olarak bilimsel açıdan incelenmesi 17.yüzyılda teleskobun yapımıyla, Fabricius (Hollanda), Scheiner (Almanya) ve Galileo (İtalya) tarafından gerçekleştirilmiştir. Güneş lekesi "Umbra" isimli koyu bir bölge ile onu kavrayan nispeten açık renkli "Penumbra" alanından meydana gelmektedir. Umbra ve Penumbra arasındaki sınır bu dönemde teleskop yardımıyla belirlenmiş olsa da, Penumbra'nın filament yapısını ayırt etmek için daha gelişmiş teleskoplar gerekliydi. Güneş'te küçük ölçekli yüzey özelliklerini belirginleştiren görsellere 19. yüzyılda ulaşılabilinmiştir. Secchi'nin çalışmaları ve Janssen'in fotoğrafları, Penumbra'da radyal çizgiler ve hafif bağlantılar, gözenekler ve granülasyon gibi ince yapı elemanlarını gösterdi (Scharmer ve ark., 2002).

Güneş lekeleri, bükülmüş manyetik alan çizgilerinin fotosferden çıktığı ve daha sonra fotosfer ve daha derin katmanlara geri döndüğü yerde oluşur. Manyetik alan çizgileri, fotosferdeki bu noktalardaki konveksiyonu bastırır, böylece enerji, fotosferdeki bu noktalarda sızan daha zor bir zamana sahiptir ve fotosferin geri kalanından daha soğuktur.

Yıldız manyetizmasının nedeni yaygın olarak kabul edilen manyetohidrodinamik (MHD) Dinamo mekanizması hakkındaki anlayışımız, çoğunlukla en yakın yıldızımızdaki manyetik aktivitenin gözlemlerine dayanır; Güneş. Güneş döngüsü, Güneş lekelerinin sayısında ve büyük ölçekli yüzey alanı evriminde periyodik bir varyasyonda kendini gösterir. Güneş manyetik aktivite döngüsü, ortalama bir süre ile 22 yıl, ne normal bir uzunluk ne de düzenli bir genliğe sahiptir. Yarım döngü uzunlukları, ayrıntılı Güneş lekesi sayısı kayıtları 17. yüzyılın başlarında başladığından beri, azalan fazdan daha dik bir yükselen faz ile 7 ila 14 yıl arasında değişmiştir (Ossendrijver, 2003). Döngü genlikleri, hem 400 yıl Güneş lekesi gözlem süresi boyunca hem de daha uzun zaman ölçeğinde önemli ölçüde değişmiştir (Beer ve ark. 1990).

Güçlü manyetik alanlarda Güneş lekeleri gözlenebilir. Güçlü manyetik alanlar Güneş lekesi spektrumlarındaki spektral çizgileri etkiler. Her absorbsiyon hatları birçok bileşene ayrılacaktır. Bileşenler içerisindeki bölünme miktarı manyetik alanın gücünü ölçer. Manyetik alan bir yolla da Güneş lekesi döngüsünden sorumludur. 11 yıllık bir döngüde, başta ve sonda yer alabilen Güneş lekeleri kuzey ve güney manyetik kutuplara sahip olurlar. Sıradaki 11 yıllık döngü içerisinde kutuplar terse dönecek ve bütün döngü 22 yılda tamamlanacaktır (Charbonneau, 2010).

Güneş lekeleri iki işlemle üretilir. İlki; manyetik akı konveksiyon bölgesi boyunca bir Ω şeklinde çıkıntı yaptığında, fotosferdeki kesit Güneş lekeleri olarak kendini gösterir. İkinci; Penumbra olmadan küçük gözeneklerin birleşmesiyle oluşurlar. Her iki durumda da, toplam manyetik akı, Ω döngüsünün dikey olarak ortaya çıkmasıyla veya birleşmeden dolayı gözeneğin artan boyutuyla arttıkça, kuvvet dengesi en dıştaki manyetik alan çizgilerinin neredeyse daha yatay olmasını gerektirir. Alan çizgileri kritik bir açıya ulaştıkça, konvektif olarak yönlendirilen filamentli istikrarsızlık, akı halatlarını Güneş yüzeyine getirir. Bu noktada, granüler konveksiyon ile yakalanır ve aşağı doğru pompalanırlar. Konvektif fotosferin ve Güneş lekesi sınırının etkileşimi, lekelerin hem yaşamı hem de ölümünü etkilediği için çok önemlidir (Choudhary, 2011).

Korona, Güneş'te en dışta ve maddenin yoğunluğunun yok denecek kadar az olduğu ancak sıcaklığın oldukça yüksek olduğu katmandır. Koronanın yapısı oldukça az denecek seviyede yoğunluğa sahip olduğundan ışıması da milyon kez daha yoğun olan Güneş'e göre oldukça düşük kalmaktadır. Dolayısıyla koronayı yalnızca Güneş tutulmaları esnasında Güneş'in ışıması perdelendiğinde görebilmekteyiz. Parker'ın 1958'deki makalesiyle ortaya attığı Güneş'in (ve diğer bütün yıldızların) manyetik alan özellikleri ve Güneşrüzgârı hakkındaki çığır açan düşünceleri ile konuya öncülük etmekte olduğu ortadadır.

Manyetik alanın varlığında patlamalar ya da patlamalar sebebiyle oluşan şok dalgalarının araştırılması son yıllarda önemli bir konu olmuştur. Rankine-Hugoniot MHD sınır koşulları, ideal bir gaz için durum denklemini dikkate alarak elde edilen teorik tanımların temelini oluşturmuştur. Silindirik ve küresel MHD şok dalgaları konusunda birçok araştırmacı tarafından oldukça fazla sayıda teorik ve deneysel çalışma yapılmıştır. Benzerlik yöntemi de dahil olmak üzere bir dizi yaklaşım (Sedov, 1959; Zel'dovich ve Raizer, 1966), güç serisi çözüm yöntemi (Sakurai, 1953, 1954) ve CCW yöntemi homojen ve homojen olmayan ortamlarda MHD şok dalgalarının teorik araştırmaları için kullanılmıştır.

Sturrock ve Spreiter (1965), şok dalgasını çalışmalarında Güneş rüzgarları ve jeomanyetik fırtınalar konusunda ayrıntılı şekilde anlatmıştır. Sturrock, bir şok dalgasının hızı ile var olduğu ortam ilişkisini denklemler ile ortaya koymuştur. Mach sayısı ve sıcaklık terimlerinde viskozite için değiştirilmiş güç kanununu kullanarak keyfi Prandtl sayısı durumunda sonuçlar hesaplanmıştır (Khidr ve Mahmoud, 1985).

Tozlu gazlarda şok dalgaları boyunca entropinin davranışı, gaz fazı ve parçacık fazı için Navier-Stokes denklemleri ile hesaplanır. Sonuç olarak altı doğrusal olmayan adi

diferansiyel denklem sistemi, tam olarak çözülen dört özerk doğrusal olmayan diferansiyel denklem sistemine indirgenir. Bu sonuç, gaz dinamik bölgedeki parçacıkların sıcaklık ve hızlarının sabit olduğu kabul edilerek resmi olarak bulunur. Entropiyi yöneten denklem sistemi, entropi profilinin şok bölgesi içinde maksimum bir değere sahip olduğunu göstermektedir. Ayrıca, entropinin hem Mach sayısını hem de parçacık yoğunluğunu yükselterek şok dalgası boyunca sürekli olarak arttığı gösterilmiştir (Hamad, 1998).

Mach sayısı, akışkanlar mekaniği konusu içerisinde bir akışkanın hızının bulunduğu ortamdaki ses hızına oranı biçiminde açıklanır. Avusturyalı fizikçi Mach, 1877 yılında sesten hızlı ilerleyen bir cismin nasıl girdaba benzer bir şok dalgası meydana getireceğini açıkladığı bir makale yayımlamıştır.

Prandtl sayısı, kinematik viskozitenin ısısal yayınma katsayısına oranıdır. Fiziksel parametreler, Mach sayısı ve Reynolds sayısıyla ilişkili biçimde önemli ölçüde değişime uğramaktadır. Bu ilişki ortamın viskozluğunun parametrelerde büyük değişimler meydana getireceğini ve ciddi bir biçimde modellerde dikkate alınması gerektiğini ortaya koymaktadır. Reynolds sayısı, akışkan mekaniği ve plazma fiziğinde olduğu gibi yakın uzay çalışmalarında da önemli bir parametredir. Bu noktada viskozite ve akış birbiri ile karşılıklı bir ters ilişki içindedir. Gezegenler arası şoklarda Güneş rüzgarının homojen olmayan etkileri çalışılmıştır (Heinemann, 2002).

Viskozite, bir hız gradyanı nedeniyle momentumun taşınmasıdır (Rha, 1975). Sürekli ortamlardaki hareketler basınç gradyanı gibi bünyesel kuvvetler sebebiyle gerçekleşirken meydana gelen hız dağılımları da genelde inhomojendir. Akışkandaki kohezyon kuvvetlerinin dağılımlarındaki değişimlere karşı gösterilen zorluklar bu inhomojenliklerin ortadan kaldırılmasına imkân sağlayabilir. Bu tür rezistif kuvvetler, akışkanda viskozite olarak adlandırılan olguyu meydana getirir (Warsi, 1999). Bu nedenle viskozite parametresi akışkan denklemlerinde dikkate alınması gereken önemli bir parametredir. Orta ve ark. (2003) Güneş koronasının ısıtılmasını inceledikleri çalışmalarında hem şok cephesinin kalınlığının hem de koronanın ısınmasının viskozite ile doğrudan ilişkili olduğunu elde etmişlerdir. Süpersonik akışlar için hem şok dalgasının hem de viskozluk etkilerinin birlikte olması dikkat çekici sonuçlar meydana getirmektedir. Bu iki konu akışkan mekaniğinde önemli bir yer tutmaktadır (Blazek, 2001). Yemin ve Xiwei (2003) çalışmalarında viskozite de dahil olmak üzere birçok fiziksel etkinin akım tabakasında etkin olabileceği öne sürülmüştür.

Viskozite dikkate alınarak yapılan bir diğer çalışma da ise; yıkıcı fiziksel etkenlerin akım tabakasına olan etkileri incelenmiştir. Ortama herhangi bir bozucu etki (viskozite, ısı

akısı) işlendiğinde aynı şartlarda yine şok dalgalarının oluşacağı fakat bu kez süreksiz değil sürekli çözümler meydana geleceği neticesine ulaşılmıştır. Akım tabakasında gerçekleştirilen bu işlemler neticesi itibariyle, koronal kütle atılımları (CME) sırasında açığa çıkacak maddenin şiddeti hesaplanabilir kılınacaktır. Sonuç olarak CME ile şok hızı arasında bağıntı kurulabilir. CME gerçekleşirken açığa çıkan enerji ısı haline dönüştüğü için hesaplanabilirliği mümkün kılınabilir (Goker, 2010).

Reynolds (*Re*) sayısı, gezegenler arası ortamda ciddi bir öneme sahiptir. *Re* sayısı Güneş rüzgârı içerisinde çok yüksek değerler (*Re*>>1) almaktadır. Bu değerler ise 10^{12}-10^{14} aralığındadır (Veselovsky, 2001; Borovsky ve Funsten, 2003). Bu konu ayrıca Reynolds sayısı ve mach sayısı değerlendirmelerinde viskoziteyi de sisteme katarak bir model geliştiren Çavuş (2013) çalışmasıyla da dikkat çekmektedir. Yine aynı alanda daha önce kullanılan bu model ile birkaç şok verisi alınarak yapılan çalışmalarda doktora tez çalışması ile Arzu Kurt (Kurt, 2016) mühim sonuçlara ulaşmıştır.

Enerji aktarımı ve momentum aktarımı denklemlerini eşzamanlı çözüm sağlayarak Korona ve Güneş rüzgarlarına ait eşsiz yapıyı saptamaya çalışan Suzuki (2004)'dir. İncelemesinde, orta ölçekli Korona'da görülen yüksek sıcaklıkla ilişkili düşük hıza sahip Güneş rüzgarı dışında, düşük ve yüksek hıza sahip Güneş rüzgarının genel yönelimini tekrardan ortaya çıkarmasını çalışmıştır.

Koronal kütle atımlarından sonra oluşan şok dalgaları Liu ve arkadaşları (Liu ve ark., 2008) tarafından incelenmiş bir konudur. Araştırmalarında verileri ACE, SOHO, WIND, ULYSSES ve STREO uydularından elde etmişlerdir. Tarihin en büyük Güneş aktivitelerinden birinde gözlemsel olarak çalışmalarını yapmışlardır. Güneş atmosferinde plazma atımı nedeniyle şok dalgaları üzerinde çalışılmıştır (Magara ve Shibita, 2008).

Güneş'ten kopan ve 300-2000 km/s değerlerine sahip parçacıklar gezegenler arası ortama çarptıklarında ve buradaki ses hızı değeri yaklaşık 100 km/s olduğundan şok dalgası oluşturma potansiyeline sahiptirler (Suzuki, 2004; Nakariakov ve ark., 2000). Bu şoklardan bazıları SOHO/LASCO gibi gözlem projeleriyle gözlenmiş ve Stepanova ve Kosovichev (2000) tarafından yayınlamıştır.

Zaman zaman Dünya atmosferine ulaşan şok dalgaları gözlemlenmektedir. Bu konu üzerine Vandegriff ve arkadaşları incelemelerinde gezegenler arası ortamda oluşan şokları saptama adına bir model oluşturmuştur (2003). Bu çalışmalarında ACE uydusundan yararlanmışlardır. Önceden saptanamayan 19 adet şok dalgası bulmuşlardır.

Bu çalışmada gezegenler arası ortamda oluşan şok dalgalarının Güneş lekeleri ile ilişkisi de incelenmektedir. Model vasıtasıyla kullanılan yöntemde elde edilen veriler

sayesinde ulaşılan sonuçlar şokların oluşmasında Güneş lekelerinin rolünü ve önemini belirleme fırsatı verecektir. Bu bilgiler ışığında tezde benzer yöntem kullanılarak ACE uydusu verilerinden faydalanılmış ve yine çok önemli sonuçlara ulaşılmıştır. Bu sonuçların bir kısmı Çavuş ve arkadaşları (2020) çalışmasında yer almıştır. Ayrıntılı sonuç ve değerlendirmeler bir sonraki bölüm olan materyal ve yöntemde sunulacaktır.

BÖLÜM 3
MATERYAL VE YÖNTEM

3.1. Temel Formüller

Öncelikle bir kontrol hacmi (V) ele alalım ve birim yüzey alanını dA şeklinde ifade edelim. Burada hız sabit (V) ve sürekli ise kütle korunur. Aradaki açı Θ ve yüzey birim normali $\vec{n}$ olacak şekilde denklemimiz;

$$\frac{dV}{dt} = VdAcos\,\Theta \quad (1)$$

$$\frac{dV}{dt} = V\vec{n}dA \quad (2)$$

halini alır.

(2) numaralı denklemi integral ile kütlesel debi cinsinden ifade edersek;

$$\int \frac{dV}{dt} = \int V\vec{n}dA \quad (3)$$

$$\dot{Q} = \int V\vec{n}dA \quad (4)$$

Burada debi için;

$$\dot{Q} \times \rho = \dot{m} \quad (5)$$

Eşitliğinden faydalanarak (4) numaralı denklemde yerine yazarsak;

$$\dot{m} = \int \rho V\vec{n}dA \quad (6)$$

halini alır ve aşağıdaki gibi hareketli kontrol hacminin birim zamanda koruduğu kütleden dolayı korunum denklemi elde edilir.

$$\int \rho V\vec{n}dA = 0 \quad (7)$$

Teğetsel kuvvetler ve basınç momentum üzerinde etkilidir. Bütün kuvvetlerin toplamı momentum korunumunda gösterilir. Aşağıda σ_{ij} yüzey normal tensörü ve τ_{ij} viskoz stres tensörüdür.

$$\sum \vec{F}_{yüzey} = \sigma_{ij}\vec{n}dA \quad (8)$$

$$\sum \vec{F}_{basınç} = -p\,\vec{n}dA \quad (9)$$

$$\sum \vec{F}_{viskozite} = \tau_{ij}\vec{n}dA \quad (10)$$

Newton ikinci yasasından faydalanarak;

$$\sum\vec{F} = m\vec{a} = m\frac{d\vec{V}}{dt} = \frac{d}{dt}(m\vec{V}) \quad (11)$$

lineer momentum biçiminde yazılabilir.

Hız ve yoğunluk bir noktadan diğerine değişebilir;

$$\sum\vec{F} = \frac{d}{dt}\int \rho\,\vec{V}\,dV \quad (12)$$

Kontrol yüzeyinde;

$$\sum\vec{F} = \int \rho\,\vec{V}(\vec{V}\vec{n})dA \quad (13)$$

durumuna gelir.

$$\int \rho\,V^2\vec{n}dA + \int \sigma_{ij}\,\vec{n}dA \quad (14)$$

çözümü gerçekleştirilirse;

$$\int(\rho\,V^2 + \sigma_{ij})\,\vec{n}dA \quad (15)$$

Momentum korunumu aşağıdaki biçimde ifade edilebilir

$$\int(\rho\,V^2 + p\delta_{ij} - \tau_{ij})\,\vec{n}dA = 0 \quad (16)$$

Burada δ_{ij} Kronecker deltadır.

İç enerji e ve entalpi E ile temsil edilecek olursa;

$$E = e + \frac{1}{2}V^2 \quad (17)$$

birim kütle başına düşen enerji şeklinde ifade edilebilir.

Seçtiğimiz dA yüzey alanı üzerindeki kütlesel değişimden kaynaklı enerji;

$$\int E\,\rho\,\vec{V}\vec{n}dA \quad (18)$$

şeklinde ele alınabilir.

Sistem üzerine ısı ve iş ile enerji aktarılabilir. B sistem enerjisi, Q ısı ve W iş olacak biçimde;

$$Q = \int \rho\,\dot{q}\,dV \quad (19)$$

$$\dot{Q}_{viskozite} = \int \vec{V}\,T\vec{n}dA \quad (20)$$

$$W = -\int p\,\vec{n}dA\,\vec{V} \quad (21)$$

$$\dot{W} = \int -k\,(\Delta T\vec{n})dA \quad (22)$$

Burada (19), (20), (21), (22) denklemlerini termodinamiğin 1.yasasında yerine yazılırsa;

$$Q+W=B \tag{23}$$

$$\int \rho \dot{q} dV+\int \vec{V} T\vec{n}dA-\int p\vec{n}dA\,\vec{V}-\int k(\Delta T\overrightarrow{n})dA=\int E\,\rho\vec{V}\vec{n}dA \tag{24}$$

eşitliği elde edilir.

Yukarıdaki son eşitlik düzenlenecek olursa;

$$\int (E\,\rho\vec{V}-\tau_{ij}\vec{V})\,\vec{n}_i dA \tag{25}$$

$$P=\rho\,RT \tag{26}$$

Çözülmesi gereken denklemler; kütle ile momentum korunumu, adyabatik akış için enerji denklemi ve ideal gaz kanunudur. Yukarıda yer alan;, σ_{ij},n_i, δ_{ij}, τ_{ij}, p,E, ρ, V, dA, T gösterimler sırasıyla yüzey normal tensörü, birim normal vektör (i=1,2,3), Kronecker delta, viskoz stres tensörü, basınç, entalpi, yoğunluk, hız, yüzey integral elemanı, sıcaklıktır. Yukarıda belirttiğimiz denklemlerde tüm değişkenler tam diferansiyelli ise (7), (16) ve (25) eşitlikleri şu şekilde yazılabilir.

$$d(\rho\,V)=0 \tag{27}$$

$$d(\rho V^2+p-\tau)=0 \tag{28}$$

$$d(\rho\,EV-\tau V)=0 \tag{29}$$

Buradayer alandenklemleri, şok öncesi 1 ve şok sonrası 2 olacak biçimde alt indislerinden faydalanarak şu şekilde yazılabilir; (Çavuş ve ark., 2020)

$$\rho_1V_1=\rho_2V_2 \tag{30}$$

$$\rho_1V_1^2+p_1-\tau_1=\rho_2V_2^2+p_2-\tau_2 \tag{31}$$

$$\rho_1E_1V_1-\tau_1V_1=\rho_2E_1V_2-\tau_2V_2 \tag{32}$$

$$\frac{P_1}{\rho_1T_1}=\frac{P_2}{\rho_2T_2} \tag{33}$$

Yazılanlar kaynaklarda Rankin-Hugoniot eşitlikleri (Zel'dovich ve Raizer, 2002) isimiyle anılır. Buradaki viskozluk terimi ve toplam entalpi şu şekilde tekrar yazılabilir (Khidr ve Mahmoud, 1985; Blazek, 2001; Priest, 2000; Çavuş, 2013; Çavuş ve ark., 2020)

$$\tau=\tau_{xx}=\frac{4}{3}\mu\frac{du}{dx} \tag{34}$$

ile

$$H = \frac{\gamma}{\gamma - 1}\frac{p}{\rho} + \frac{1}{2}u^2 \tag{35}$$

Burada u; hız, H; entalpi, μ; dinamik viskozite katsayısı ve γ; adyabatik indis olarak bilinir. (34) ve (35) ile momentum ve enerji denklemleri;

$$\rho_1 u_1^2 + p_1 - \frac{4}{3}\mu\frac{du_1}{dx} = \rho_2 u_2^2 + p_2 - \frac{4}{3}\mu\frac{du_2}{dx} \tag{36}$$

$$(\frac{\gamma}{\gamma - 1}p_1 + \frac{1}{2}\rho_1 u_1^2 - \frac{4}{3}\mu\frac{du_1}{dx})u_1 = (\frac{\gamma}{\gamma - 1}p_2 + \frac{1}{2}\rho_2 u_2^2 - \frac{4}{3}\mu\frac{du_2}{dx})u_2 \tag{37}$$

halini alır. Reynolds sayısının (*Re*) tanımı viskoz terim $\mu(du/dx) \approx (\rho u^2)/Re$ şeklinde tekrar kullanılarak Reynolds sayısı cinsinden yazılabilir (Çavuş, 2013).

Sonuç olarak (36). ve (37). denklemler;

$$\rho_1 u_1^2 + p_1 - \frac{4}{3}\frac{\rho_1 u_1^2}{Re_1} = \rho_2 u_2^2 + p_2 - \frac{4}{3}\frac{\rho_2 u_2^2}{Re_2} \tag{38}$$

$$(\frac{\gamma}{\gamma - 1}p_1 + \frac{1}{2}\rho_1 u_1^2 - \frac{4}{3}\frac{\rho_1 u_1^2}{Re_1})u_1 = (\frac{\gamma}{\gamma - 1}p_2 + \frac{1}{2}\rho_2 u_2^2 - \frac{4}{3}\frac{\rho_2 u_2^2}{Re_2})u_2 \tag{39}$$

biçiminde yazılır.

Yoğunluklar oranını

$$\frac{\rho_2}{\rho_1} = \kappa \tag{40}$$

olarak kullanılırken, şok öncesi Mach sayısı;

$$M_1 = \frac{u_1}{c_{s1}} \tag{41}$$

biçiminde yazılırken, şoktan önceki ses hızını;

$$c_{s1} = \sqrt{\gamma\frac{p_1}{\rho_1}} \tag{42}$$

biçiminde ifade ederek;

$$\frac{u_2}{u_1} = \kappa^{-1} \tag{43}$$

$$\frac{p_2}{p_1} = \gamma M_1^2 (1-\kappa^{-1}) - \frac{4}{3}\gamma M_1^2 (\frac{1}{Re_1} - \frac{1}{\kappa Re_2}) + 1 \tag{44}$$

$$\frac{p_2}{p_1}\frac{u_2}{u_1} = \frac{c_{s2}^2}{c_{s1}^2} \tag{45}$$

sonuçlarına ulaşırız. Burada elde edilen sonuçta sıkışma oranı; κ (24). eşitliğin pozitif çözümüdür (Çavuş, 2013; Çavuş ve ark., 2020).

$$[(\frac{1}{2} - \frac{4}{3}\frac{1}{Re_1})(\gamma-1)M_1^2 + 1]\kappa^2 - [(1 - \frac{4}{3}\frac{1}{Re_1})\gamma M_1^2 + 1]\kappa + (\frac{\gamma+1}{2} - \frac{4}{3}\frac{1}{Re_2})M_1^2 = 0 \tag{46}$$

Burada Re_1; şok öncesi ve Re_2; şok sonrası Reynolds sayısını belirtmektedir. M_1; şok öncesi Mach sayısını temsil etmektedir. Son olarak yazdığımız (46). denklem genel eşitlik adını alır. Genel eşitlik ile gerçekleşecek sonuç bize sıkışma oranı sayesinde probleme ait diğer fiziksel parametrelerinde kolaylıkla bulunabilmesi imkanını verecektir. Genel eşitlik adını verdiğimiz denklem, dinamik viskozite katsayısı 0 değerini aldığında inviskoz duruma indirgenmektedir. Şoktan önceki Mach sayısının artması ile beraber sıkıştırma oranı (κ) da artmaktadır. Bununla beraber sıkışma oranı güçlü şok dalgası oluşması halinde (M_1=2,5 ve 4) çok yüksek bir değere ulaşmaktadır.

3.2. Denklemlerin Entropi Kısmı

Meydana gelecek şokta entropinin davranışını inceleyeceğimiz denkleme ulaşmak için, aşağıdaki eşitlikten faydalanılacaktır (Wesseling, 2001; Çavuş ve Kurt , 2015)

$$T\delta S = \delta e + p\delta(1/\rho) \tag{47}$$

Buradaki p, ρ, T, δ, e ve S bize sırasıyla basınç, yoğunluk, sıcaklık, küçük değişimler, dahili enerjiyi ve entropiyi göstermektedir. Dahili enerji e ve entalpi olan H'den faydalanarak;

$$e = H - \frac{p}{\rho} \tag{48}$$

halini alır. (47) numaralı denklem ideal gaz için;

$$\delta S = c_v \delta \ln(\frac{p}{\rho}) - R\delta \ln(\rho) \tag{49}$$

biçiminde olurken, burada $c_v = R/(\gamma - 1)$; sabit hacimdeki öz ısı ve R; gaz sabitidir. Burada(49) numaralı eşitlik $R = c_p - c_v$ sayesinde ayrıca bir de sabit basınçtaki öz ısı olan $c_p = \gamma R/(\gamma - 1)$ eşitlikten faydalanarak;

$$\delta S = c_v \delta \ln(p) - c_p \delta \ln(\rho) \tag{50}$$

şeklinde yazılabilir ve sabit c_v ile

$$S = c_v \ln(p/\rho^{\gamma}) \tag{51}$$

haline dönüşür. Bu eşitlikten yararlanarak entropi değişimi;

$$S_2 - S_1 = c_v \ln[\frac{p_2}{p_1} \kappa^{-\gamma}] \tag{52}$$

halini alır (Çavuş ve Kurt, 2015).

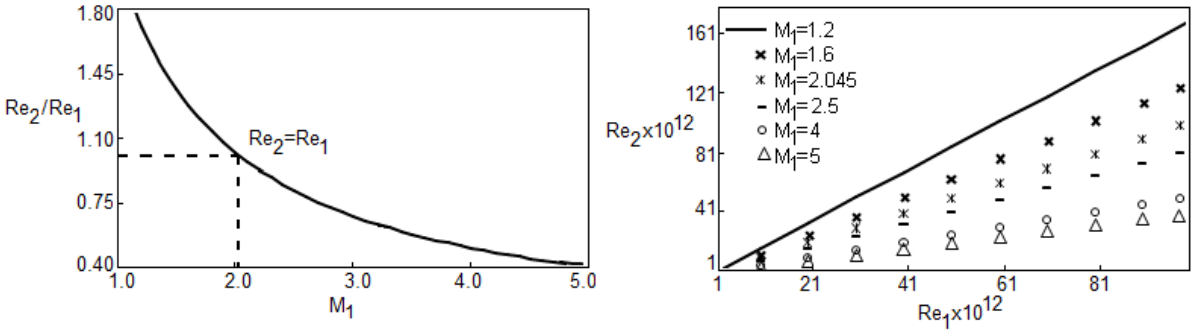
Entropi farkı (S2-S1), Mach sayısı oranları, basınç oranı, Re_2/Re_1ve diğer değerlerden çalışmada referans değerler şeklinde faydalanılacaktır. Sonuçlar kısmında ayrıntılı biçimde bu baz alınan değerler açıklanmıştır.

Bir akışkanın viskoz davranışı Reynolds sayısı kullanılarak tanımlanabilir. Reynolds sayısı, akışkan hareketinin eylemsiz ve viskoz kuvvetleri arasındaki ilişkiyi verdiğinden, akışın karakteri Reynolds sayısından belirlenebilir. Yüksek Reynolds sayısı kaybolan viskozitenin bir sonucu olabilir ve düşük değerleri yüksek viskozitenin sonucudur. Viskoz stres akışkan hızının bir fonksiyonu olarak yazıldığından, viskozite akışkan hızındaki farklılıklar ile belirlenebilir. Böyle bir enerji tüketme mekanizması, akış değişkenlerinin değerlerini kontrol eder (Çavuş, 2013)

3.3.Şoktan Sonraki Reynolds Sayısının Değeri

Gezegenler arası ortamda Reynolds (*Re*) sayısının değeri çok önemli bir rol oynamaktadır. *Re* sayısı Güneş rüzgarı içerisinde çok yüksek değerler (*Re*>>1) almaktadır. Sayısal olarak ise 10^{12}-10^{14} arasında değerler kullanılmaktadır (Veselovsky, 2001; Borovsky ve Funsten, 2003). Genel eşitlik olarak da bilinen (46) eşitliğinin çözülebilmesi için Re_2 değerinin Re_1 cinsinden ifade edilmesi gereklidir. Bu amaçla Bruhn ve ark. (2005) ve Çavuş (2013) çalışmalarından hareketle Şekil 2'deki gibi Re_1 ve M_1'e bağlı değişimler elde edilebilir. M_1'e bağlı değişim incelendiğinde artan M_1 değerleri için Re_2/Re_1'in azaldığı gözlenmektedir. $M_1 \approx 2$ civarında ise $Re_1 = Re_2$ olarak karşımıza çıkmaktadır. M_1'in

bu değeri zayıf şoktan güçlü şoka geçiş noktası olarak bilinmektedir (Warsi, 1999; Çavuş, 2013).



Şekil 2 Re_2'nin M_1 ve Re_1'e göre değişimi (Çavuş, 2013)

Bu denklem sistemlerinde ve incelemelerde, Reynolds sayısının şok dalgaları üzerindeki etkileri görülmüş ve korunum durumlarda viskoz stres tensörü de eklenerek sabit hidrodinamik denklemleri elde edilmiştir. Buradaki şok incelemesinde, yukarıdaki gibi momentum korumasını gösteren Navier-Stokes denklemleri çalışılmalıdır. Akışkanın viskoz davranışı Reynolds sayısından faydalanılarak açıklanabilir. Çözümler, sıkıştırma oranı, Mach sayısı, basınç oranları, Re_2/Re_1ve şok sürecinde entropi değişimi gibi fiziksel parametreler açısından değerlendirilmektedir.

Sonraki bölümde elde edilen araştırma bulguları verilmekte ve sonrasında tartışılmaktadır. Elde edilen verilerde ACE uzay aracı verilerinin model ile incelenmesi gerçekleştirilmiş ve sonuçlar paylaşılmıştır. Ayrıca modelden elde edilen sonuçların AAVSO (AmericanAssociation of Variable Star Observers,) veri kaynağından sağlanan Güneş lekeleri ile olan korelasyonları da incelenmiştir.

BÖLÜM 4

ARAŞTIRMA BULGULARI

4.1.ACE Uzay Aracına Ait Verilerin İncelenmesi

EK-1. Şok Sayısı'nda sunulduğu gibi, 1998-2014 yılları arasında ACE uydusu tarafından ölçülmüş 235 adet şok dalgası mevcuttur. Bunları sınıflandırmak gerekirse; % 86,38'i hızlı ileri (fast forward FF: $\kappa > 1$, $T_2/T_1>1$, $B_2/B_1>1$), %2,55'i yavaş ileri (slow forward SF: $\kappa > 1$, $T_2/T_1 > 1$, $B_2/B_1 < 1$), %8,94'ü hızlı geri (fast reverse FR: $\kappa< 1$, $T_2/T_1 <1$, $B_2/B_1 < 1$) ve %2,14'ü ise yavaş geri (slow reverse SR: $\kappa< 1$, $T_2/T_1 < 1$, $B_2/B_1 > 1$) şoklardır. Yukarıda anlatılan model yardımıyla bu şok dalgalarının %89'unu oluşturan ileri tür (FF ve SF) şoklar için inceleme yapılmıştır. EK-1. Şok Sayısı' nda sunulan bu veriler için inceleme yapılmış ve sonuçlar EK-2. Model ile Alınan Sonuçlar' da sunulmuştur. Aşağıda verilen Tablo 2'de 1998 yılına ait bazı veriler için Çavuş (2013) modelinin bir uygulaması örnek olarak gösterilmiştir (Çavuş ve ark., 2020). Tüm sonuçlar için EK-2. Model ile Alınan Sonuçlar incelenebilir.

Tablo 2

1998 yılına ait bazı örnek veriler için modelin uygulanması

							DOY	**$n_2$ref**	**DOY**	**$n_2$ref**
							49,32848	**32,20000**	**63,45699**	**8,30000**
							n_1	**u_1**	**n_1**	**u_1**
							21,6000	**377,8691**	**4,4000**	**352,2747**
M_1	**Re_2/Re_1**	**M_2/M_1**	**κ**	**U_2/U_1**	**S_2-S_1**	**Cs_2^2/Cs_1^2**	**n_2**	**u_2**	**n_2**	**u_2**
1,15	1,7782	0,7631	1,2238	0,8171	0,0257	1,1465	26,4347	308,7598	5,3848	287,8464
1,20	1,7041	0,7052	1,2973	0,7708	0,0555	1,1948	28,0216	291,2741	5,7081	271,5451
1,30	1,5730	0,6103	1,4414	0,6938	0,1572	1,2922	31,1335	262,1607	6,3420	244,4036
1,40	1,4607	0,5363	1,5806	0,6327	0,3168	1,3918	34,1419	239,0601	6,9548	222,8677
1,50	1,3633	0,4771	1,7143	0,5833	0,5320	1,4948	37,0286	220,4237	7,5429	205,4936
1,60	1,2781	0,4290	1,8417	0,5430	0,7978	1,6018	39,7813	205,1711	8,1036	191,2742
1,70	1,2029	0,3893	1,9626	0,5095	1,1082	1,7132	42,3932	192,5302	8,6357	179,4894

ACE uzay aracından alınan şok sonrası yoğunluk ($n_2$ref) verisi ve model yardımıyla bulunan n_2 değeri ile karşılaştırılarak şok dalgasına ait Mach sayısı aşağıdaki gibi bulunabilir.

Tablo 3

Sıralı bir biçimde M_1 ve n_2 değerleri

M_1	n_2
.	.
$M_{1(k-1)}$	$n_{2(k-1)}$
$M_{1(k)}$	$n_{2(k)}$
.	.

Örnek olarak verilen Tablo 3'te model sonuçları (M_1 ve n_2) sıralı bir biçimde sunulmuştur. ACE uzay aracı tarafından ölçülmüş n_2ref verisi ile şok öncesi Mach sayısı M_1; $n_{2(k-1)} < n_2ref < n_{2(k)}$ olmak şartı ile doğrusal interpolasyon kullanılarak;

$$M_1 = \frac{n_2 ref}{2}\left(\frac{M_{1(k-1)}}{n_{2(k-1)}} - \frac{M_{1(k)}}{n_{2(k)}}\right) \tag{53}$$

denklemi ile hesaplanabilir. Aynı yöntemle tüm model parametreleri (κ, M_2/M_1, M_2, Re_2/Re_1, U_2/U_1, n_2, u_2, S_2-S_1 ve Cs_2^2/Cs_1^2) hesaplanmıştır. Şok dalgalarının şiddeti için aşağıdaki gibi bir formül (Rathakrishnan, 2010) kullanılmıştır.

$$St = \frac{P_2 - P_1}{P_1} = \gamma M_1^2\left(1 - \frac{1}{\kappa} - \frac{4}{3}\frac{1}{\mathrm{Re}_1} + \frac{4}{3\kappa}\frac{1}{\mathrm{Re}_2}\right) \tag{54}$$

Tablo 4

Şoklar için şiddet sınıflandırması

St_{Rel}	**Şok Sınıfı**	**Kısaltması**	**Koşul**
1	Çok Zayıf	VW	$M_1 \leq 1{,}34$
2	Zayıf	W	$1{,}34 < M_1 \leq 2$
3	Orta	M	$2 < M_1 \leq 3$
4	Güçlü	S	$3 < M_1 \leq 5$
5	Çok Güçlü	VS	$M_1 > 5$

Şok şiddetinin yanısıra şoklar için bir sınıflandırma da yapılmış ve şok sınıfları "çok zayıf (VW)", "zayıf (W)" "orta (M)", "güçlü (S)" ve "çok güçlü (VS)" olarak belirlenmiştir. Bu sınıflandırmalara denk gelen şiddetin ölçüsü (göreli şiddet) St_{Rel} 1 (çok zayıf), 2 (zayıf), 3 (orta), 4 (güçlü) ve 5 (çok güçlü) biçiminde düzenlenmiştir ve Tablo 4'te görülebilir.

ACE uydusu tarafından ölçülmüş her bir şok dalgası için M_1, Re_2/Re_1, M_2/M_1, M_2, Kappa, U_2/U_1, S_2-S_1, Cs_2^2/Cs_1^2, n_2, u_2, şok sınıfı, şiddet, St, St_{Rel}ve P_2/P_1 değerleri elde edilmiştir. Sonuçlar EK-3. Parametreler' de sunulmuştur. Aşağıdaki Tablo 5'te 1998 yılına bazı şoklar için örnek uygulama verilmiştir.

Tablo 5

1998 yılına ait bazı şoklar için model parametrelerin değerleri (Tamamı EK-3. Parametreler' de sunulmuştur)

Yılın Günü	49,32848	63,45699
M_1	1,33	1,64
Re_2/Re_1	1,498481	1,235242
M_2/M_1	0,566929	0,407636
M_2	0,762479	0,670994
κ	1,48812	1,890574
U_2/U_1	0,655409	0,524038
S_2-S_1	0,230886	0,943418
Cs_2^2/Cs_1^2	1,322121	1,64729
n_2	32,14339	8,318526
u_2	247,6588	184,6053
St	0,9977	2,1338
P_2/P_1	1,9977	3,1338
Şok sınıfı	VW	W
St_{Rel}	1	2

4.2.Güneş Lekeleri ve Şoklar Arasındaki İlişkinin Belirlenmesi

Bu çalışmada gezegenler arası ortamda oluşan şok dalgalarının Güneş lekeleri ile ilişkisini de inceleme fırsatı bulunmaktadır. Model vasıtasıyla kullanılan yöntemde elde edilen veriler sayesinde ulaşılan sonuçlar şokların oluşmasında Güneş lekelerinin rolünü ve önemini belirleme fırsatı verecektir (Çavuş ve ark., 2020).

Koronal kütle atımları kapalı manyetik ilmeklerden kaynaklanmaktadır. Kapalı manyetik ilmeklerin doğrudan Güneş lekelerine bağlı olmasından dolayı CME kaynaklı şokdalgaların Güneş leke sayıları ile arasında bir ilişki olması gerektiği öngörülmüştür. Bu amaçla AAVSO organizasyonuna ait Güneş leke gözlem verileri elde edilmiştir. Yıllık toplamlar üzerinden, 1998-2014 yılları arasındaki şok dalgalarına ait fiziksel parametreler

ve Güneş leke sayıları arasındaki korelasyonlar incelenmiş ve bazı sonuçlar Tablo 6'da gösterilmiştir. Tüm sonuçlar ise EK -4. Korelasyonlar'da sunulmaktadır.

Tablo 6

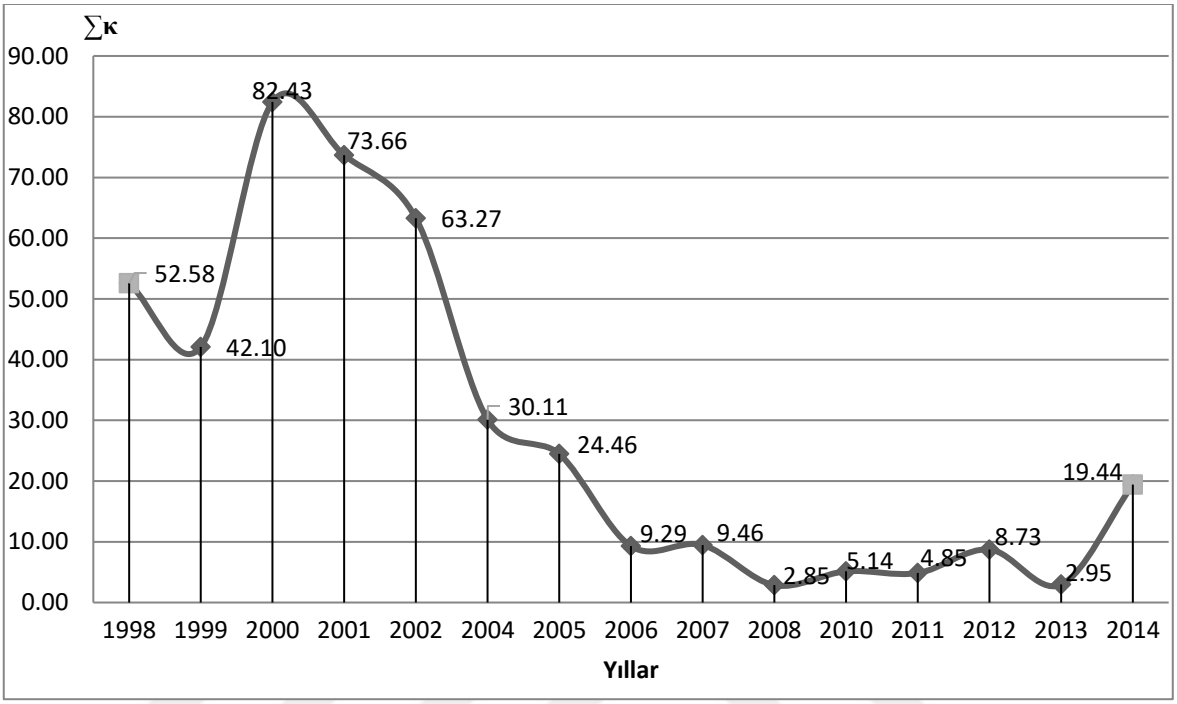
Bazı yıllar için Güneş lekelerinin ve fiziksel parametrelerin yıllık toplamları ve bunların Güneş lekeleri ile olan korelasyonları

	1998	***1999***	**…**	***2013***	***2014***	**Güneş Lekeleri ile Korelasyon**
Toplam Güneş Lekesi	26438	35073	**…**	22250	27215	
$\sum M_1$	51,7	40,46	...	2,93	17,25	0,869295648
$\sum S_t$	145,5	97,26	...	9,55	31,60	0,734299903
$\sum St_{Rel}$	68	45	...	3	19	0,850998934
$\sum M_1/M_2$	87,76	67,25	...	5,65	27,80	0,863533201
$\sum \kappa$	52,57	42,10	...	2,95	19,43	0,871423695
$\sum n_1u_1$	77650,19	44164,06	**…**	1807,09	20279,0	0,779031963
$\sum n_2u_2$	77823,43	44260,95	**…**	1783,83	20571,8	0,777481397
$\sum Cs_2^2/Cs_1^2$	63,47	46,72	**…**	3,54	18,08	0,806588816

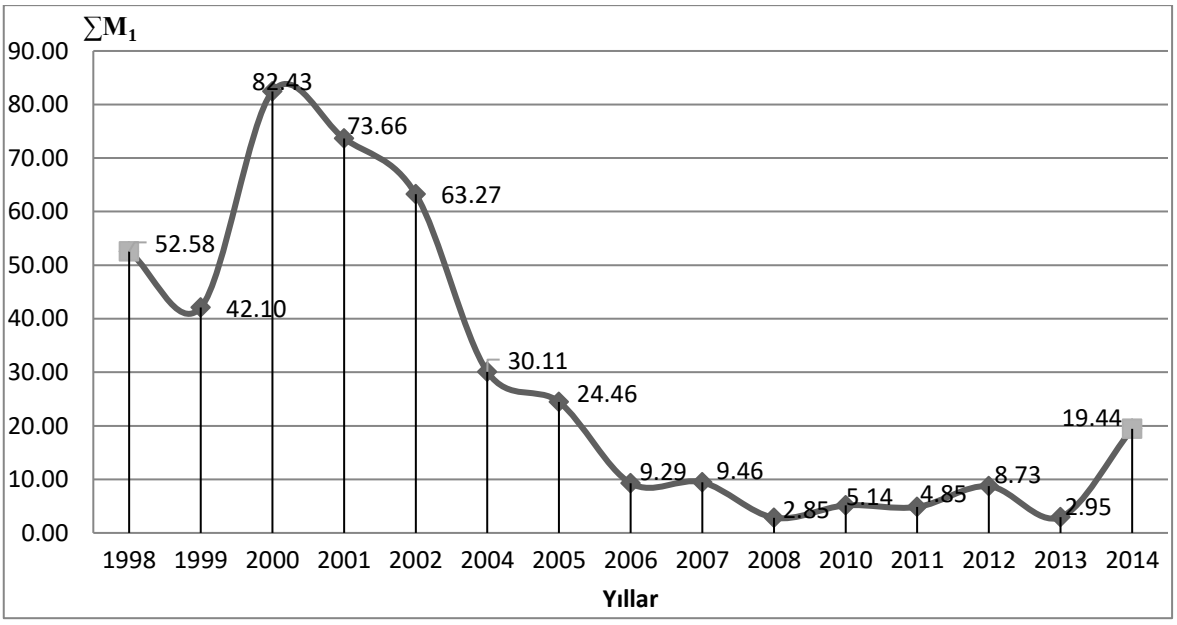
Tablo 6 ve EK-4. Korelasyonlar incelendiğinde Güneş lekeleri (AAVSO) ve modelimize ait fiziksel parametreler arasında yüksek oranda bir korelasyon çıktığı görülebilir. Bu sonuçtan da anlaşılacağı üzere Güneş leke sayısındaki artış daha fazla koronal kütle atımına ve dolayısıyla şok dalgası oluşma ihtimalinde artışa neden olmaktadır. Güneş lekeleri sayıları ile şok dalgaları arasındaki yüksek korelasyon gözlenen Güneş leke sayısı ve oluşacak şok dalgası hakkında bilgi verebilir.

Tezde, 1998 ve 2014 yılları arasında ACE uydusu ile kaydedilen tüm şok dalgalarını tek tek aynı yöntemle inceleme fırsatı bulunmakta ve fiziksel parametrelere ilişkin yıllık verileri elde edilmektedir. Ulaşılan sonuçlar Güneş lekeleri ile şok dalgalarının, fiziksel parametreler ve sayılarıyla oldukça bağlantılı olduğunu düşündürmektedir. Buradan hareketle görmekte olduğumuz Şekil 3 ve 4'tte, bazı yıllarda (2004 ve 2013 gibi) fiziksel parametrelerde göreceli bir düşüş olmuştur. Şekil 5'teki Güneş lekesi grafiği incelendiğinde, şaşılacak bir durum olmadığı anlaşılabilir. Sebebi, Güneş aktivitesinin doğrudan Güneş lekelerine bağlı olmasıdır. ACE uzay aracının 1998 ve 2014 yılları

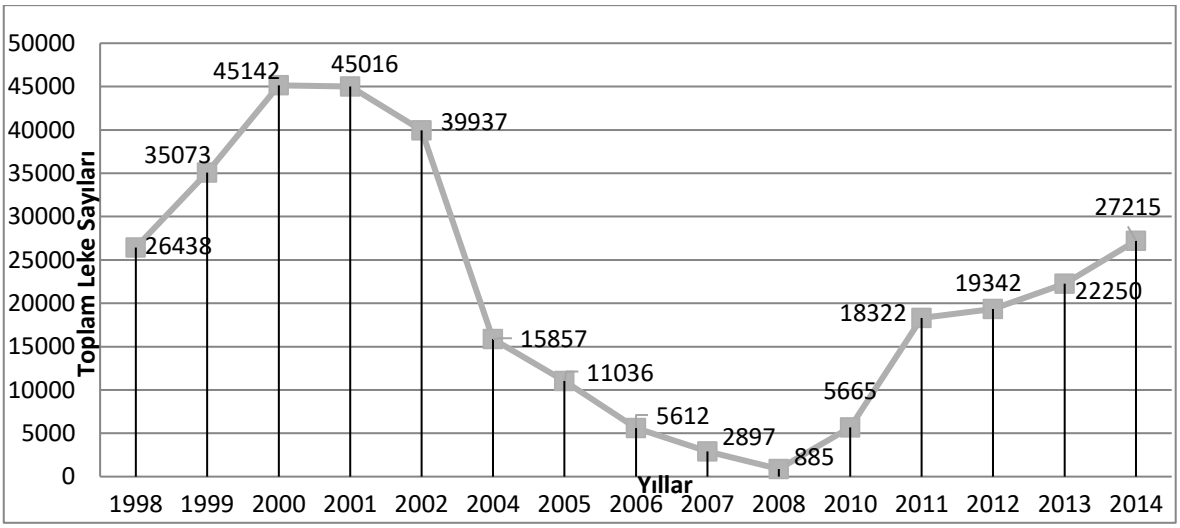
arasında kaydettiği Güneş rüzgarı verileri gezegenler arası şokların jeomanyetik fırtınalar üzerindeki etkilerini ve Güneş lekesi sayısıyla olan ilişkilerini istatistiksel olarak incelemek için iyi bir fırsat sağlamıştır (Çavuş ve ark., 2020).



Şekil 3 1998-2014 yılları arasında yıllık toplam sıkışma oranı değerleri



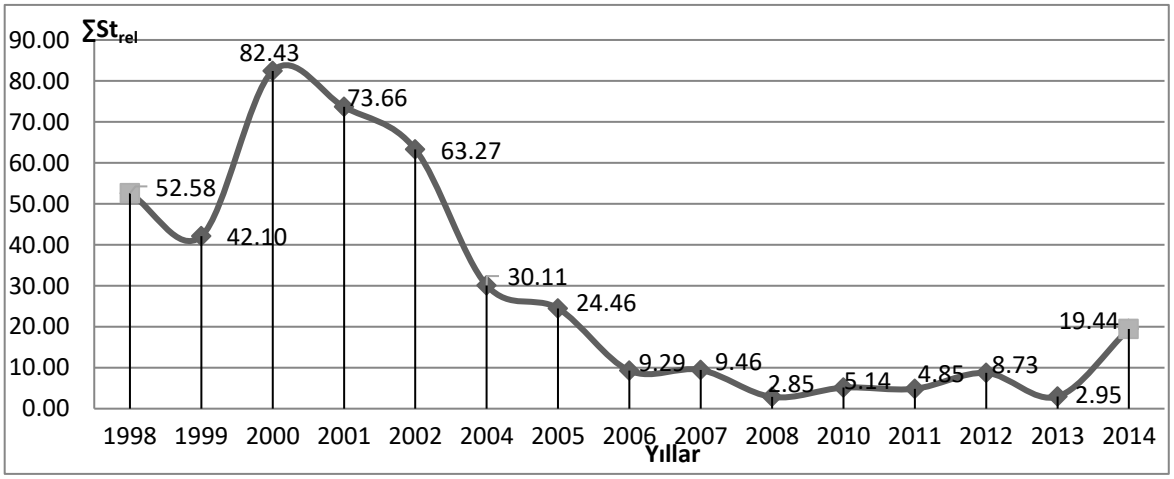
Şekil 4 1998-2014 yılları arasında yıllık toplam M_1 sayıları



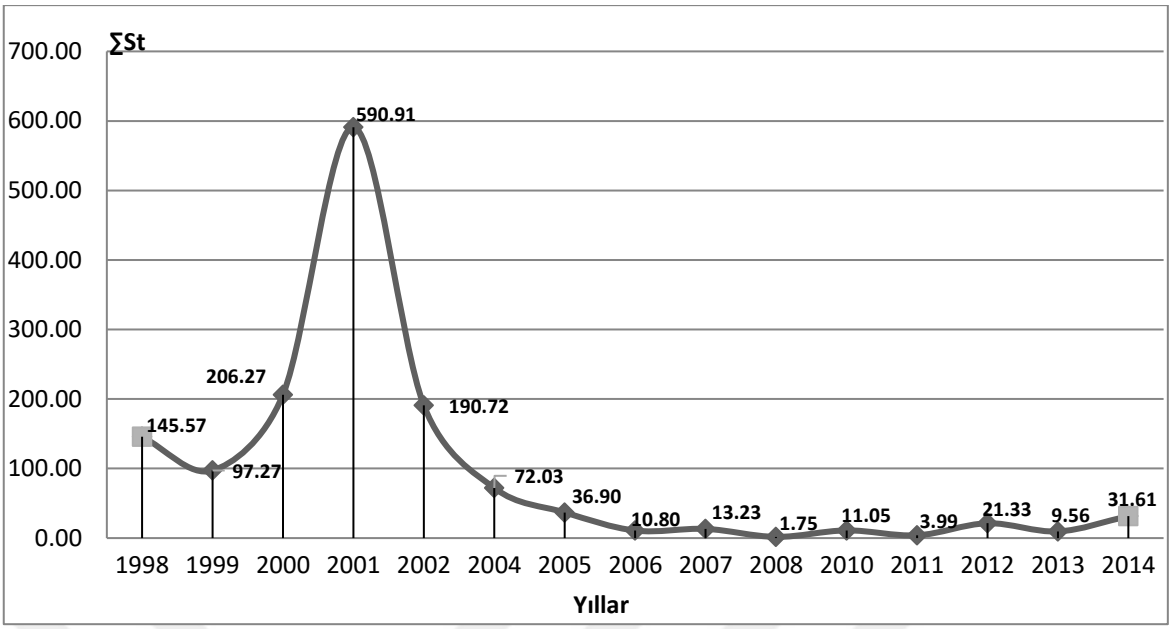
Şekil 5 1998' den 2014'e kadar olan yıllarda AAVSO veritabanından elde edilen Güneş leke sayıları verilmiştir

Şokların fiziksel parametreleri ile Güneş lekeleri arasındaki korelasyonlar nedeniyle, Güneş lekelerinin değişmesinden bahsetmek kaçınılmazdır. Güneş lekeleri ve Güneş olayları, daha önce de belirtildiği gibi doğrudan ilişkili fenomenlerdir (Çavuş ve ark., 2020). Şekil 5'ten görülebileceği gibi Güneş lekelerinin sayısı 23 döngüsünde uçları için 2008'de minimum değerlere ulaştı. Burada korelasyon nedeniyle bu yıllar için minimumlarına sahip oldukları Şekil 3 ve 4'ten çıkarılabilir. Benzer bir durum, bu döngülerin maksimuma sahip olduğu 2000 ve 2014 yılları için de geçerlidir. Fiziksel parametreler de maksimuma sahip olma eğilimindedir.

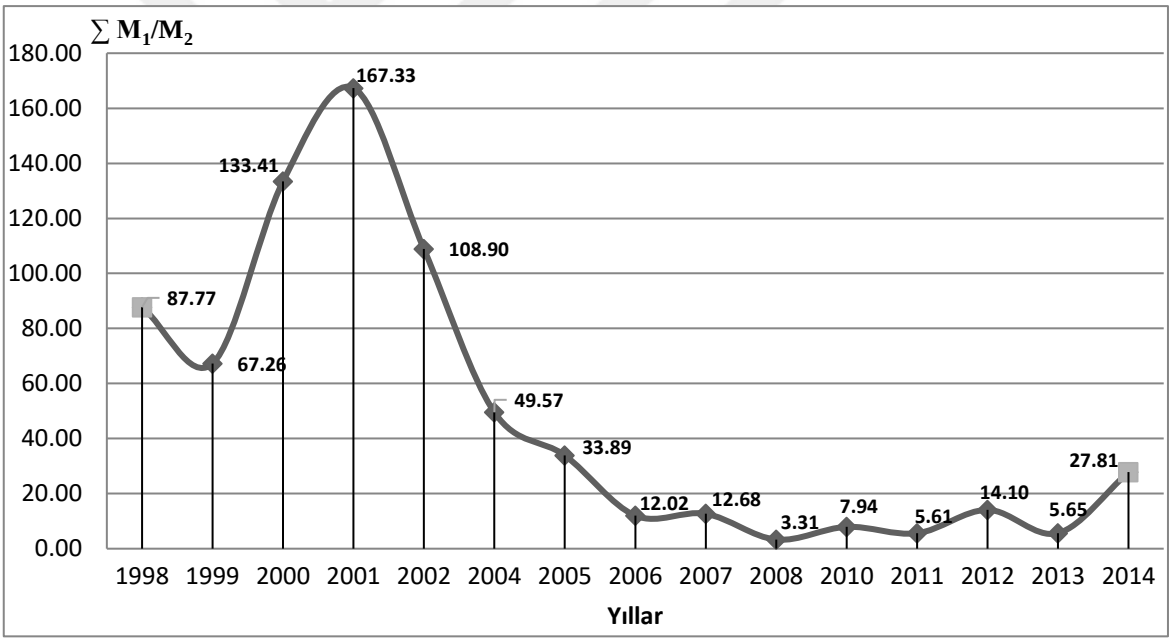
ACE uydusu tarafından ölçülen şok dalgaları yıllar boyunca homojen bir dağılım göstermediğinden dolayı fiziksel parametrelerin yıllık verileri ile çalışılmıştır.



Şekil 6 1998-2014 yılları arasında yıllık toplam göreli şiddet değerleri (∑Strel)

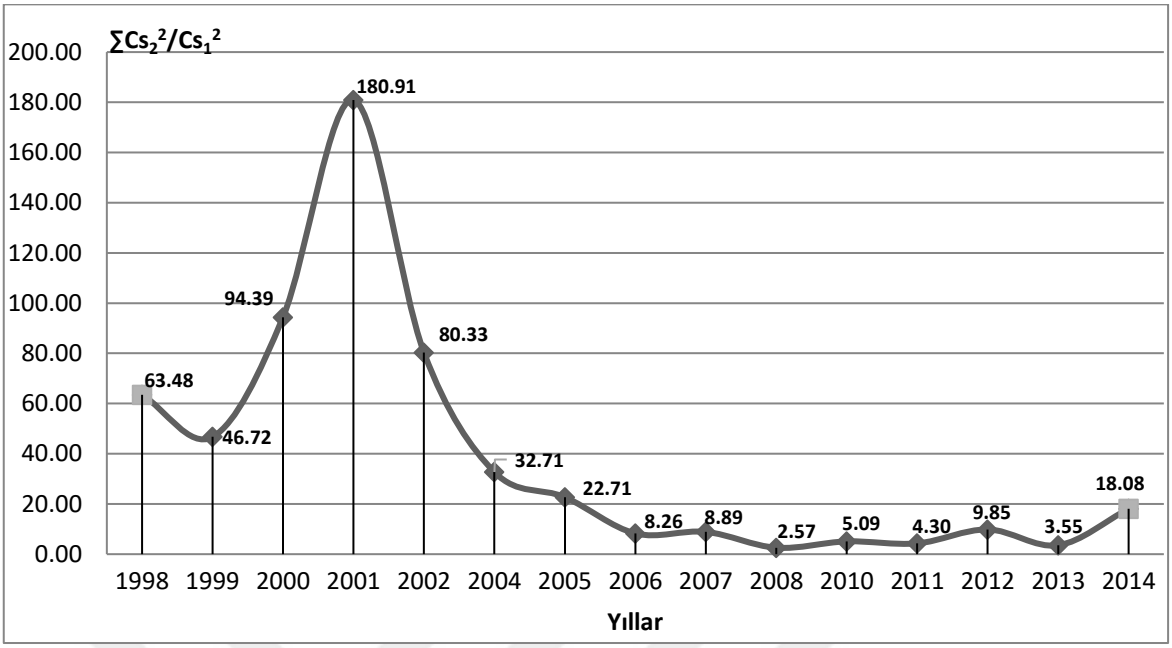


Şekil 7 1998-2014 yılları arasında yıllık toplam şiddet değerleri (∑St)

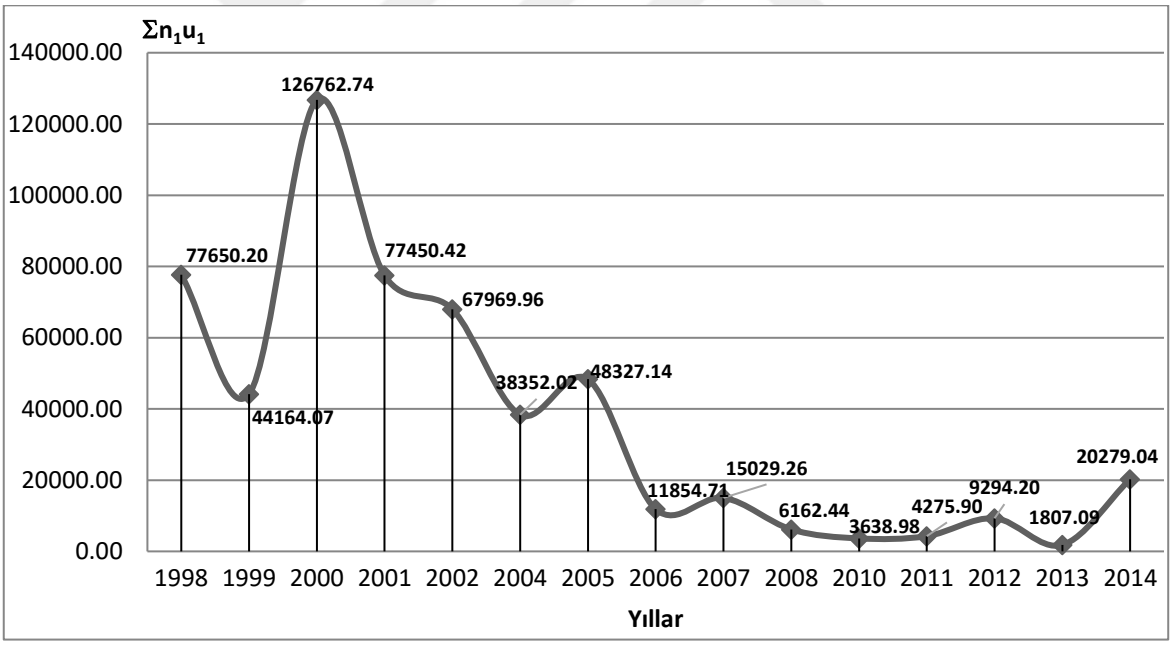


Şekil 8 1998-2014 yılları arasında yıllık toplam M_1/M_2 oranları

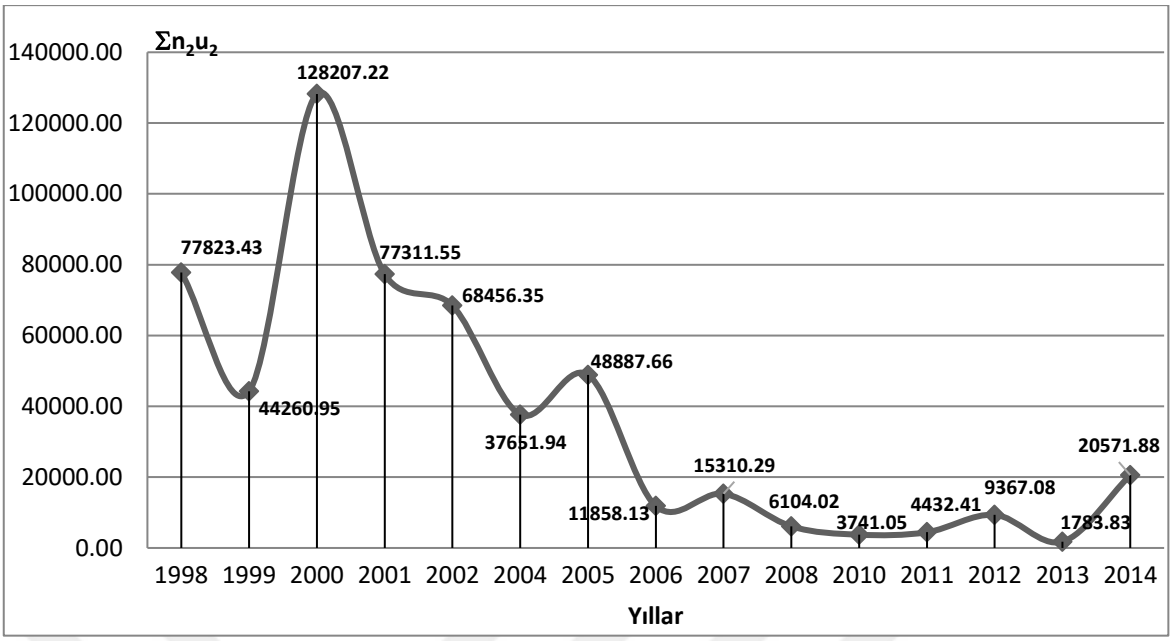
Şekil 5'ten görülebileceği gibi Güneş lekelerinin sayısı 2000 ve 2001' de yüksek değerlere ulaştı. Burada korelasyon nedeniyle bu yıllarda toplam göreli şiddet ($\sum St_{rel}$) için yüksek değerlere sahip oldukları Şekil 6'da çıkarılabilir. Benzer bir durum Şekil 7'de 2001 yılında toplam şiddet ($\sum St$) için de geçerlidir. Toplam şiddet ve toplam göreli şiddet değerleri verilen yıllarda maksimuma sahip olma eğilimindedir. Ayrıca Şekil 8'de $\sum M_1/M_2$ değerleri de 2001 yılında maksimuma sahiptir. 2008' de Güneş lekelerinin minimum değer almasıyla Şekil 8'de toplam Mach oranının da minimum değerler aldığı görülmektedir.



Şekil 9 1998-2014 yılları arasında toplam ses hızları için kareler oranı ($\sum Cs_2^2/Cs_1^2$)



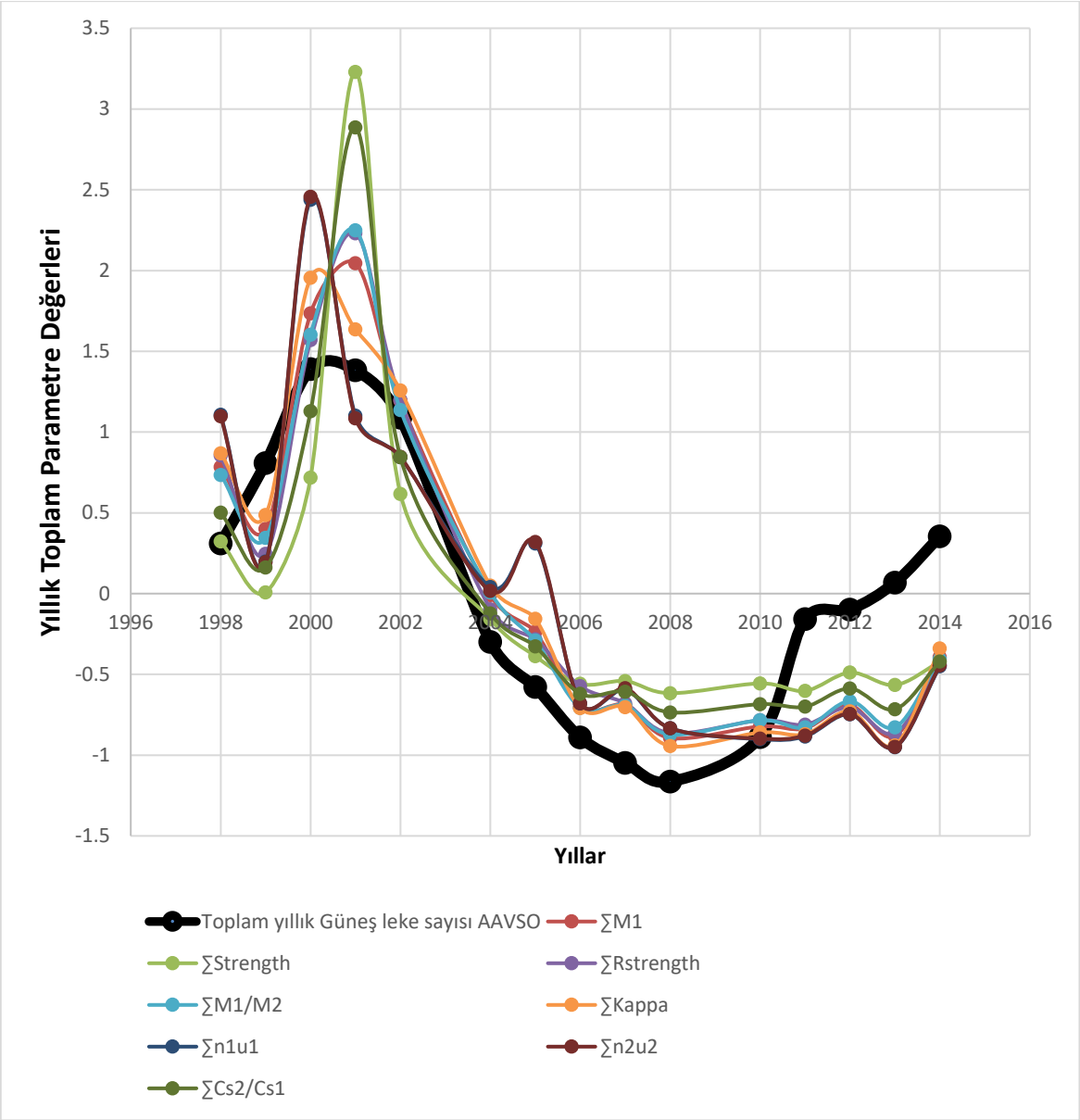
Şekil 10 1998-2014 yılları arasında şok öncesi için toplam kütle akısı ($\sum n_1u_1$)



Şekil 11 1998-2014 yılları arasında şok sonrası için toplam kütle akısı ($\sum n_2 u_2$)

Şok fiziğinden bilindiği gibi, her iki taraftaki kütle akısı korunmalıdır. Bu nedenle, aralarında iyi bir korelasyon olmalıdır. Şekil 10 ve Şekil 11'de verilen değerler ile görüldüğü üzere aralarındaki korelasyon katsayısının hesaplanan değeri 0.999 olarak bulunmuştur.

Bu bilgiler ışığında aşağıdaki grafikte AAVSO veri tabanından 1998-2014 yılları için elde ettiğimiz verileri yıllık toplam parametrelerin tamamıyla bir arada göstermek mümkün olmuştur. Güneş leke sayılarının arttığı gözlenen bazı yıllarda parametrelerinde bu paralellikte arttığı sıklıkla gözlemlenmiştir. Örneğin Tablo 6 da görüldüğü üzere 2013 yılından 2014 yılına geçişte Güneş leke sayısı artışı parametrelere de yansımıştır. Şekil 12' de bu gözlem yine 1999 ile 2000 yıllarında görülmektedir. Yüksek korelasyon bize bu şekil üzerinde ayrıntılı olarak parametrelerin leke sayıları ile olan ilişkisini göstermektedir.



Şekil 12 1998-2014 yıllarındaki toplam Güneş leke sayısı ve tüm parametrelerin bir arada gösterimi

Bir sonraki bölümde araştırma ve bulgular sayesinde edinilen verilerin yorumlandığı sonuç kısmı gelmektedir.

BÖLÜM 5
SONUÇ

Bu tez çalışmasının iki adet amacı vardır. Birincisi, gezegenler arası ortamda oluşan ve ACE uydusu tarafından ölçülen Güneş kaynaklı şok dalgalarının bazı fiziksel parametreler üzerindeki etkilerini Çavuş (2013) tarafından yapılan hidrodinamik bir model kullanılarak hesaplanması iken ikinci amaç ise bu parametreler ile Güneş lekeleri arasındaki korelasyonu araştırmaktır.

ACE uzay aracı, 1998 ve 2014 yılları arasında Güneş rüzgarı verilerini yerinde topladı. Bu çalışmada kullanılan veri seti, gezegenler arası şokların jeomanyetik fırtınalar üzerindeki etkilerini ve bunların Güneş lekesi sayısı ile ilişkisini istatistiksel olarak incelemek için iyi bir fırsat sağladı. Hızlı olarak tabir edilen koronal kütle atımlarının Güneş'ten Dünya'ya ulaşması yaklaşık 1-2 gün sürer, daha yavaş olanlar ise 3-4 gün içinde Dünya'ya ulaşır (Shea ve Smart, 2012). Uzay hava tahmininde gezegenler arası bir şok dalgasının varış zamanını bilmek, meydana gelebilecek bir jeomanyetik fırtınanın tahminini mümkün kılabilir (Wu ve Lepping, 2016). Dünya'ya ulaştıklarında, atmosferle etkileşime girerler ve büyük bir enerji transferi değeri meydana gelir. Radyo iletişimi, jeomanyetik fırtınalar ve şok dalgaları nedeniyle bozulabilir ve uyduların elektronik devrelerinde sorunlar ortaya çıkabilir (Jurac ve ark., 2002; Shea and Smart, 2012).

Çalışma sırasıyla 1996–2008 ve 2008–2014 dönemlerini kapsayan 23 ve 24'lük Güneş çevrimlerini içermektedir. 23. döngü için 1998 yılı minimumun olduğu yıla yakındır. Bu döngü için maksimuma 2002 yılında ulaşılmıştır. ACE uzay aracı tarafından gözlemlenen şok sayısı, 1998 ve 2002 için sırasıyla 26 ve 31'dir. Döngü 24, 2008 ve 2014 yıllarında minimum ve maksimuma ulaştı. Bu yıllar için, tespit edilen şok sayısı sırasıyla 5 ve 10' dur. Beklentimiz, şok sayısı ile Güneş döngüsü arasında bir paralellik olması gerektiğidir. Durumun böyle olmadığı şok rakamlarından anlaşılıyor. Bunun nedeni, CME'lerin Güneş'in Dünya'ya bakan tarafına doğru değil, başka yönlere doğru oluşma olasılığı ve ACE uydusunda oluşturulan ölçüm sistemlerinin arızası olabilir. Mevcut çalışmada bu tür olumsuzlukların giderilmesi için yıllık veriler üzerinden çalışmanın uygun olduğu görülmüştür (Çavuş ve ark., 2020).

Oh ve ark. (2007), 1995–2001 yılları arasında gezegenler arası şokların nedenlerini ve fiziksel parametrelerini, WIND (1995–1997, yani minimum döngü 23 dahil) ve ACE (23 döngü maksimum için 1998–2001) verilerini kullanarak araştırdı. Döngü 23 için yapıldı ve çalışmanın amacı gezegenler arası şoklar için birincil şok sürücüsünü belirlemekti. Manyetik bulutlar, atımlar, yüksek hızlı akışlar ve bazı bilinmeyen sürücüler

olmak üzere dört farklı tipte şok sürücüsünü düzelttiler. Çalışma, gezegenler arası şok dalgalarından sorumlu olan temel şok sürücüsünün, gezegenler arası şokları için birincil şok faktörü olduğu düşünülen manyetik bulutlar olduğu sonucuna varmıştır. Şokların büyük kısmı (% 68) maksimum döngü süresinde meydana gelir. Mevcut çalışmamıza benzer şekilde, fiziksel parametrelerin değerleri (örn. Şok hızı, Mach sayısı, sıkıştırma oranı) Güneş döngüsü ile iyi bir korelasyona sahiptir. Söz konusu çalışmada bulunan sonuçlarla hemfikiriz. Oh ve arkadaşlarının 2007 çalışmasındaki şok sürücü kısmına benzer şekilde, Kilpua ve ark. (2015), 1995-2013 yılları arasındaki hızlı ileri ve hızlı geri gezegenler arası şokları WIND, ACE ve STEREO gözlemlerini kullanarak inceledi. İstatistiksel olarak, bu uzay araçlarından 679 şok üzerinde yoğunlaştılar. FF şoklarının FR şoklarına hakim olduğunu buldular. FR ve FF şoklarının sırasıyla akış etkileşimleri ve CME nedeniyle meydana geldiğini belirlediler. Yukarıda listelenen nedenlerden dolayı, gezegenler arası bölgedeki fiziksel parametreleri bilmek önemlidir. Bu tezin ana hedeflerinden biri, AAVSO'nun veri tabanında verilen Güneş lekeleri ile bu korelasyonu araştırmaktı.

Elde edilen veriler sayesinde çalışmanın ulaştığı sonuçlar aşağıda sıralanmıştır;

1. Şok fiziğinden bilindiği gibi, her iki taraftaki kütle akısı korunmalıdır. Bu nedenle, aralarında iyi bir korelasyon olmalıdır. $\sum n_1u_1$ ve $\sum n_2u_2$ arasındaki korelasyon katsayısının hesaplanan değeri 0.999 olarak bulunmuştur.

2. Şok öncesi toplam Mach sayısı ($\sum M_1$) değeri için en büyük korelasyonlar elde edildi. En küçük değerlerise toplam şiddet için elde edildi ($\sum$ St).

3. Gezegenler arası şokların fiziksel parametreleri, Tablo 6'da gösterildiği gibi AAVSO veritabanının Güneş leke sayıları ile iyi bir ilişki içerisindedir.

4. 1998-2014 yılları arasında ACE ile 235 gezegenler arası şok dalgası ölçüldü. Bunlar 203 hızlı ileri, 6 yavaş ileri, 21 hızlı geri ve 5 yavaş geri tipi şoklardan oluşuyordu. Gezegenler arası şoklar için yıllık ortalama gerçekleşme oranları 13.8' dir. Yüzdeler sırasıyla hızlı ileri, yavaş ileri, hızlı geri ve yavaş geri tipi şoklar için 86.38, 2.55, 8.94 ve 2.13'tür.

5. Bu tezin hemen hemen tüm aşamalarının ve araştırma bulgularının kullanıldığı Advances in Space Research dergisinde Çavuş ve arkadaşları (2020) çalışması yayınlanmıştır.

Bu çalışmadaki veriler, uzay hava tahmini ve Dünya atmosferinde meydana gelen fiziksel olaylar hakkında daha ayrıntılı bir bakış açısı sağlayabilir. Yüksek radyasyondan

kaynaklanan arızaları tahmin etmek, uzay yolculuğu, görev uydularının fırlatma sürelerini belirlemede önemli bir rol oynayacaktır.

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EKLER

EK1. Şok Sayısı

EK Tablo 1

Year	Month	Day		DAY of the YEAR	Vx	Vy	Vz	V	n1	n2	n2-n1	
1998	2	18	49.328.484	49,328484	-375,3	-25,7	-35,7	377,869	21,6	32,2	10,6	
1998	3	4	63.456.991	63,456991	-351,5	10	-21,1	352,275	4,4	8,3	3,9	
1998	4	23	113.728.032	113,728032	-322,9	-16	8,3	323,403	11,7	41,1	29,4	
1998	4	30	120.363.576	120,363576	-306,60	-22,90	-3,70	307,48	9,00	50,50	41,5	
1998	5	1	121.890.613	121,890613	-496,20	18,70	-35,60	497,83	5,30	15,40	10,1	
1998	5	3	123.708.565	123,708565	-429,10	1,10	11,70	429,26	4,20	12,80	8,6	
1998	5	8	128.389.861	128,389861	-531,70	44,00	-4,50	533,54	5,70	9,80	4,1	
1998	5	15	135.581.516	135,581516	-306,50	-24,00	-11,00	307,63	9,40	34,70	25,3	
1998	5	29	149.627.419	149,627419	-526,50	-22,90	0,20	527,00	8,70	15,80	7,1	
1998	6	13	164.788.692	164,788692	-307,50	-6,20	4,40	307,59	3,90	17,20	13,3	
1998	6	25	176.654.977	176,654977	-395,70	-11,80	-12,20	396,06	13,10	22,60	9,5	
1998	7	5	186.136.088	186,136088	-441,70	-11,10	-39,60	443,61	6,10	10,20	4,1	
1998	7	31	212.385.498	212,385498	-410,80	8,40	2,00	410,89	6,20	10,10	3,9	
1998	8	6	218.280.671	218,280671	-370,30	-9,50	-6,30	370,48	12,10	27,60	15,5	
1998	8	10	222.004.560	222,004560	-402,90	8,60	-1,00	402,99	4,80	9,70	4,9	
1998	8	15	227.498.623	227,498623	-373,50	12,40	-22,90	374,41	2,80	5,60	2,8	SF
1998	8	26	238.264.525	238,264525	-449,70	23,60	-25,20	451,02	4,90	15,40	10,5	
1998	9	24	267.967.639	267,967639	-435,60	25,60	17,30	436,69	9,90	21,00	11,1	
1998	10	2	275.286.887	275,286887	-505,70	5,40	15,10	505,95	3,70	7,90	4,2	
1998	10	18	291.792.234	291,792234	-319,90	9,80	-1,80	320,06	17,80	44,90	27,1	
1998	10	23	296.523.519	296,523519	-491,90	6,60	10,90	492,07	3,60	9,10	5,5	
1998	11	7	311.317.014	311,317014	-416,20	16,20	-25,20	417,28	6,10	11,00	4,9	
1998	11	8	312.181.458	312,181458	-457,80	10,00	5,50	457,94	5,30	11,80	6,5	
1998	11	12	316.271.817	316,271817	-344,20	-10,80	-16,10	344,75	5,60	9,60	4	
1998	12	21	355.951.400	355,951400	-355,10	13,20	51,50	359,06	12,70	20,00	7,3	
1998	12	28	362.731.759	362,731759	-382,90	-9,50	20,90	383,59	10,30	15,00	4,7	
											0	
1999	2	11	42.325.405	42,325405	-374,90	-0,30	-5,70	374,94	12,50	24,70	12,2	
1999	2	17	48.266.505	48,266505	-460,20	-15,00	-12,80	460,62	7,70	12,10	4,4	
1999	2	18	49.089.468	49,089468	-395,80	-19,50	-47,40	399,10	3,90	10,60	6,7	
1999	3	10	69.027.951	69,027951	-411,20	-7,80	-23,60	411,95	10,30	15,90	5,6	
1999	4	16	106.441.424	106,441424	-374,60	-25,90	20,10	376,03	4,70	9,30	4,6	
1999	5	5	125.624.537	125,624537	-377,60	-29,60	18,00	379,19	4,80	15,00	10,2	
1999	5	18	138.002.488	138,002488	-340,90	-16,50	18,50	341,80	8,30	28,10	19,8	
1999	5	25	145.408.947	145,408947	FR	FR	FR	FR	FR	FR	FR	FR
1999	7	26	207.981.273	207,981273	-397,1	11,1	8,30	397,34	2,70	3,90	1,2	
1999	8	4	216.052.743	216,052743	-329,2	-14,50	-4,30	329,55	5,80	19,80	14	
1999	8	8	220.739.410	220,739410	-370,9	-6,70	2,00	370,97	1,70	2,80	1,1	
1999	8	15	227.401.991	227,401991	-331,9	-3,00	-21,50	332,61	12,20	32,50	20,3	

Tablo 1'in devamı											
1999	8	22	234.950.683	234,950683	412,80	2,00	1,30	412,81	2,50	4,30	1,8
1999	8	23	235.479.201	235,479201	-385,60	13,40	14,50	386,11	7,20	8,90	1,7
1999	10	28	301.476.875	301,476875	-374,70	14,90	-17,80	375,42	5,70	9,70	4
1999	11	13	317.509.074	317,509074	-403,80	-29,30	5,70	404,90	3,40	7,10	3,7
1999	11	19	323.999.062	323,999062	-444,30	3,70	-15,60	444,59	4,60	6,90	2,3
1999	12	11	345.501.447	345,501447	-440,30	-0,70	-3,30	440,31	3,20	4,50	1,3
1999	12	12	346.635.150	346,635150	-362,30	-18,40	8,30	362,86	0,80	1,80	1
1999	12	26	360.894.016	360,894016	-368,5	-34,3	-11,1	370,26	3,7	6,6	2,9
											0
2000	1	11	11.569.745	11,569745	-422,5	-6,8	-23,1	423,19	12,4	20,5	8,1
2000	1	22	22.015.648	22,015648	-327,6	9,1	-51,5	331,75	6,9	13	6,1
2000	1	27	27.581.019	27,581019	-331,4	-15,8	23,9	332,64	41,5	85,9	44,4
2000	1	30	30.781.204	30,781204	-609,9	30,3	17,5	610,90	3,8	5,2	1,4
2000	2	5	36.617.488	36,617488	-374,5	-8,3	16,5	374,96	6,5	13,3	6,8
2000	2	11	42.092.303	42,092303	-414,5	4,6	-25,8	415,33	3,3	8,9	5,6
2000	2	11	42.971.377	42,971377	-433,5	-9,7	-11	433,748	5,5	19,7	14,2
2000	2	14	45.289.699	45,289699	-573	-1,1	-25,9	573,586	3,6	5,6	2
2000	4	17	108.402.199	108,402199	FR	FR	FR	FR	FR	FR	FR	FR
2000	4	24	115.369.421	115,369421	-470	-7,4	18,6	470,426	5,2	7,7	2,5
2000	5	30	151.056.412	151,056412	FR	FR	FR	FR	FR	FR	FR	FR
2000	6	3	155.336.215	155,336215	-381	-36	5,3	382,734	11	15,5	4,5
2000	6	4	156.599.363	156,599363	-407,1	19,7	-2,3	407,583	2,6	4,9	2,3
2000	6	8	160.361.944	160,361944	-508,7	0,6	-39,1	510,201	3,8	12,4	8,6
2000	6	11	163.303.611	163,303611	-461,1	-15	-5,5	461,377	3,2	4,1	0,9
2000	6	23	175.518.600	175,518600	-400,3	18	-12,5	400,899	6,9	17,6	10,7
2000	7	10	192.248.576	192,248576	-403,3	-3,3	6,5	403,366	6,8	13,6	6,8
2000	7	11	193.474.132	193,474132	-412,4	19,7	-12,5	413,059	19,8	38,3	18,5
2000	7	13	195.376.528	195,376528	-507,2	18,9	15,5	507,789	4,6	10	5,4
2000	7	13	195.388.194	195,388194	-600,2	10,7	40	601,627	9,9	19,6	9,7
2000	7	19	201.617.072	201,617072	-472,9	-38,5	20,9	474,925	3,1	9,9	6,8
2000	7	26	208.746.516	208,746516	-356,4	3,2	-9,5	356,541	11,4	23,3	11,9
2000	7	28	210.237.998	210,237998	-336,2	-4,5	-19,4	336,789	4,6	20,1	15,5
2000	7	28	210.381.701	210,381701	-385,2	33,4	46,6	389,443	19,4	34,9	15,5
2000	8	11	224.757.604	224,757604	-407,3	9,3	-3,9	407,425	2,1	4,4	2,3
2000	9	4	248.530.521	248,530521	-446,2	1,7	29,9	447,204	5	10,5	5,5
2000	9	6	250.675.891	250,675891	-389,7	-4,9	-1,1	389,732	9,5	28,5	19
2000	9	17	261.706.424	261,706424	-589,9	-41,2	40,9	592,75	10,2	14,1	3,9
2000	9	30	274.443.264	274,443264	-395,8	-25,2	-15,1	396,889	8,8	11,4	2,6
2000	10	3	277.005.845	277,005845	-387	-6,9	-3,8	387,08	6,5	15,6	9,1
2000	10	5	279.111.215	279,111215	-358,3	-35	13,8	360,27	7	16,8	9,8
2000	10	28	302.380.637	302,380637	-368,9	-44,6	28,5	372,678	8,9	26,6	17,7

Tablo 1'in devamı												
2000	10	31	305.687.650	305,687650	-349,7	28,1	4,8	350,86	7,1	20,7	13,6	
2000	11	4	309.065.995	309,065995	-357,2	-34,4	4,7	358,883	13,2	48,4	35,2	
2000	11	6	311.385.243	311,385243	-472,6	-19,7	20,8	473,468	2,1	5,1	3	
2000	11	8	313.555.787	313,555787	FR	FR	FR	FR	FR	FR	FR	FR
2000	11	11	316.167.465	316,167465	-749,4	1,8	-6,1	749,427	1,1	2,7	1,6	
2000	11	26	331.475.023	331,475023	-463,9	24,9	-24,8	465,229	8,8	21,9	13,1	
2000	11	28	333.206.505	333,206505	-525,1	15,7	4,3	525,352	7,4	12,8	5,4	
2000	11	29	334.129.838	334,129838	-536,1	-24,7	-21,6	537,103	6,2	11,7	5,5	
2000	12	3	338.139.456	338,139456	-380,5	-18,6	5,2	380,99	3,6	5,5	1,9	
											0	
2001	1	10	10.638.669	10,638669	-346	-15,7	-33,2	347,944	5,2	15,3	10,1	
2001	1	13	13.071.076	13,071076	-355,5	-13,4	-42,5	358,282	1	5,2	4,2	
2001	1	17	17.647.002	17,647002	370,3	10,1	-3,8	370,457	12,5	25,1	12,6	
2001	1	23	23.421.065	23,421065	-417,4	18	7,3	417,852	2,7	13	10,3	
2001	1	31	31.307.153	31,307153	-370,6	20,4	-18	371,597	4,3	17	12,7	
2001	3	3	62.443.970	62,443970	-444,6	25,7	12,2	445,509	4	7,6	3,6	
2001	3	27	86.047.998	86,047998	-360,6	11,1	13	361,005	5,6	25,9	20,3	
2001	3	27	86.718.924	86,718924	421,1	-0,1	40,1	423,005	7,4	16	8,6	
2001	3	30	89.910.961	89,910961	-415,5	-12,7	20,5	416,199	14	33,5	19,5	
2001	4	4	94.598.924	94,598924	-457,6	-24	5,4	458,261	5	8,3	3,3	
2001	4	7	97.707.801	97,707801	-438,2	-25,6	-15,1	439,207	4,1	12,4	8,3	
2001	4	8	98.439.468	98,439468	-492,5	-8,5	-32,7	493,658	5,5	14,8	9,3	
2001	4	11	101.551.863	101,551863	-504,2	-1,9	-8,9	504,282	3,2	8,1	4,9	
2001	4	11	101.644.271	101,644271	-620,4	-37,3	-1,6	621,522	11,8	22,2	10,4	
2001	4	18	108.003.160	108,003160	-373	-28,2	-2,5	374,073	5,7	24,3	18,6	
2001	4	21	111.629.630	111,629630	-350,3	-16,4	-10	350,826	6,6	14,9	8,3	
2001	4	28	118.188.877	118,188877	-457	-36,7	5,7	458,507	3,5	11	7,5	
2001	5	8	128.397.014	128,397014	-363	3	1,8	363,017	3,5	6,6	3,1	
2001	6	7	158.369.942	158,369942	-371,9	-37,7	-24,8	374,628	5,1	9,1	4	
2001	8	3	215.267.824	215,267824	-378,1	21,6	-22,2	379,367	6,5	26,1	19,6	
2001	8	12	224.450.590	224,450590	-341,7	14,8	17,5	342,468	7,3	35,1	27,8	
2001	8	17	229.427.801	229,427801	-346,7	5,4	21,4	347,402	3,8	17,9	14,1	SF
2001	8	27	239.805.012	239,805012	-452,3	3,4	-15,4	452,575	5,8	17,2	11,4	
2001	9	14	257.054.236	257,054236	-369,6	7	14	369,931	7,1	16,9	9,8	
2001	9	29	272.379.387	272,379387	-537,4	-18,4	4	537,73	3	6,9	3,9	
2001	9	30	273.782.361	273,782361	-458,6	-37,9	7,8	460,23	12,6	18,1	5,5	
2001	10	3	276.338.090	276,338090	-494,2	-1,1	18,2	494,536	4,9	11	6,1	
2001	10	11	284.680.486	284,680486	-371,8	-49,9	3,9	375,154	8	26	18	
2001	10	21	294.675.289	294,675289	-381,9	18,7	17,2	382,744	9,8	29,3	19,5	
2001	10	25	298.334.734	298,334734	-355,2	-30,9	-2,8	356,553	4,9	18,5	13,6	
2001	10	28	301.112.315	301,112315	-357,7	-15,8	-15	358,363	3,2	9,8	6,6	

Tablo 1'in devamı											
2001	10	31	304.536.944	304,536944	-329,8	-3	-10,2	329,971	2,8	7,7	4,9
2001	11	19	323.732.662	323,732662	-436,4	7,2	-25,8	437,221	3,5	8,1	4,6
2001	11	30	334.727.824	334,727824	-342,8	-22,3	-4,3	343,551	4,2	7,1	2,9
2001	12	29	363.199.641	363,199641	-364,3	7,8	-11,2	364,556	12,4	47,1	34,7
2001	12	30	364.813.530	364,813530	-428,6	1,2	-36,4	430,145	6,2	15,2	9
											0
2002	1	17	17.239.051	17,239051	-364,6	-9,2	2,9	364,728	4,5	9	4,5
2002	2	17	48.089.931	48,089931	-363,5	5,2	2,2	363,544	10,2	37,1	26,9
2002	3	22	81.140.984	81,140984	-429,1	-36,2	-1,9	430,628	6,3	7,5	1,2
2002	3	23	82.453.762	82,453762	-394,5	-8,5	5,8	394,634	3,3	11,2	7,9
2002	3	25	84.040.058	84,040058	-401,1	-36,2	2,9	402,741	1	1,8	0,8
2002	4	17	107.430.949	107,430949	-344,7	-37	11,2	346,861	12	51,5	39,5
2002	4	19	109.335.023	109,335023	-426,6	20,4	-33,2	428,376	1,1	2,5	1,4
2002	4	23	113.177.407	113,177407	-427,3	-14,1	16,4	427,847	5,1	14,2	9,1
2002	5	10	130.436.852	130,436852	-355,8	13	5,5	356,08	8,2	20,6	12,4
2002	5	11	131.392.396	131,392396	-355,9	-16	-43,3	358,881	10	25,1	15,1
2002	5	18	138.805.162	138,805162	-346,6	-22,8	-33,1	348,923	7,6	20,1	12,5
2002	5	20	140.122.940	140,122940	-434,2	22	23	435,365	4,9	7	2,1
2002	5	21	141.874.606	141,874606	-362,2	2,6	-42,3	364,671	16,4	18,3	1,9
2002	5	23	143.427.743	143,427743	-423,6	-11,4	-42,7	425,899	11,8	21,2	9,4
2002	5	30	150.064.225	150,064225	-461,6	-12,5	-22,3	462,307	2,1	3,7	1,6
2002	7	17	198.643.218	198,643218	-410,2	41,5	7,9	412,37	7	18,8	11,8
2002	7	19	200.397.477	200,397477	-437,4	73,3	26,8	444,308	1,6	4,4	2,8
2002	7	19	200.612.477	200,612477	-446,7	-14,5	-80,6	454,145	3,8	6,9	3,1
2002	7	22	203.201.725	203,201725	-479,9	4	17,7	480,243	4,7	7,6	2,9
2002	7	25	206.541.354	206,541354	-447,4	0,7	22,1	447,946	3,2	4,5	1,3
2002	7	29	210.528.021	210,528021	-390,6	-33,6	29,4	393,143	6,3	12,7	6,4
2002	8	1	213.183.380	213,183380	-378,6	-17,9	3,7	379,041	1,5	5,1	3,6
2002	8	1	213.930.231	213,930231	-430,1	-0,6	3,3	430,113	9,2	16,6	7,4
2002	8	18	230.757.245	230,757245	-424,4	-5,6	18,5	424,84	3,9	15,8	11,9
2002	9	7	250.672.743	250,672743	-385,4	-20,8	11,4	386,129	3,5	12,9	9,4
2002	10	2	275.926.400	275,926400	-455,5	-11,8	12,8	455,833	4	6,1	2,1
2002	11	9	313.745.972	313,745972	-353,5	-13,4	-26,8	354,768	12,4	24,9	12,5
2002	11	16	320.961.331	320,961331	-436,9	-21,9	-3,3	437,461	6,8	10,4	3,6
2002	11	26	330.882.060	330,882060	-393,8	-19,2	11,1	394,424	7,4	19,7	12,3
2002	12	24	358.551.829	358,551829	-481,4	-0,4	9,6	481,496	5,5	9,1	3,6
											0
2004	1	22	22.044.819	22,044819	-474	-36	-16,8	475,662	6,1	17,7	11,6
2004	4	9	100.075.691	100,075691	-453,9	0	-11,9	454,056	4,5	9,1	4,6
2004	4	10	101.810.133	101,810133	-441,2	-1,6	43,2	443,313	4	9,6	5,6
2004	4	12	103.733.197	103,733197	-417,6	-2,5	-18,5	418,017	3,3	9,4	6,1

Tablo 1'in devamı												
2004	4	24	115.339.961	115,339961	-431,7	-38,6	13,6	433,636	5	8,2	3,2	
2004	4	24	115.969.948	115,969948	SR	SR	SR	SR	SR	SR	SR	SR
2004	5	28	149.463.875	149,463875	-365,4	-40,1	29,2	368,752	7,6	11,4	3,8	SF
2004	7	16	198.879.685	198,879685	-391	-18,3	8,3	391,516	7,6	15	7,4	
2004	7	22	204.412.778	204,412778	-379,8	14,9	-0,6	380,093	3,5	12,1	8,6	
2004	7	26	208.935.919	208,935919	-602,1	46,7	39,7	605,212	2,1	4,9	2,8	
2004	7	30	212.855.496	212,855496	-433,5	15,7	3	433,795	2,6	5,7	3,1	
2004	11	7	312.416.306	312,416306	-345,9	-57,9	-18,3	351,19	21,4	60,7	39,3	
2004	11	7	312.745.865	312,745865	-483,6	6,1	-15,4	483,884	17	35,5	18,5	
2004	11	8	313.180.610	313,180610	FR	FR	FR	FR	FR	FR	FR	FR
2004	11	11	316.697.132	316,697132	-545,2	3,3	-23,4	545,712	5,2	10	4,8	
2005	1	11	11.831.630	11,831630	-400,90	-46,40	12,30	403,76	23,00	31,90	8,9	
2005	1	17	17.302.744	17,302744	-526,70	25,90	22,40	527,81	4,30	9,10	4,8	
2005	1	21	21.699.613	21,699613	-598,30	-16,10	-13,10	598,66	5,90	15,90	10	
2005	4	5	95.106.624	95,106624	FR	FR	FR	FR	FR	FR	FR	FR
2005	5	6	126.502.545	126,502545	-354,80	-24,40	9,70	355,77	10,90	24,00	13,1	
2005	5	7	127.762.856	127,762856	-375,60	-44,50	-8,30	378,32	19,00	33,70	14,7	
2005	6	14	165.745.743	165,745743	-443,40	0,80	26,50	444,19	7,10	12,70	5,6	
2005	6	16	167.339.549	167,339549	-464,20	16,50	19,80	464,91	6,20	7,20	1	
2005	7	10	191.116.083	191,116083	-355,60	-7,30	15,40	356,01	9,40	17,40	8	
2005	8	24	236.234.526	236,234526	-441,90	-8,80	-9,70	442,09	9,60	24,30	14,7	
2005	9	2	245.569.280	245,569280	-449,60	-52,70	-46,90	455,10	5,40	10,50	5,1	
2005	9	9	252.553.203	252,553203	-349,10	-27,40	17,60	350,62	13,00	35,70	22,7	
2005	9	15	258.353.471	258,353471	-546,50	-12,30	0,20	546,64	2,80	6,10	3,3	
2005	10	8	281.258.110	281,258110	FR	FR	FR	FR	FR	FR	FR	FR
											0	
2006	1	1	1.561.559	1,561559	-437,6	17,9	10,6	438,09	6	10,8	4,8	
2006	6	12	163.309.788	163,309788	SR	SR	SR	SR	SR	SR	SR	SR
2006	7	28	209.456.146	209,456146	FR	FR	FR	FR	FR	FR	FR	FR
2006	8	18	230.658.887	230,658887	-351,7	10,3	4,1	351,87	6,7	7,5	0,8	
2006	8	19	231.451.713	231,451713	-386,4	23,1	-1,9	387,09	7,1	15,1	8	
2006	8	31	243.259.318	243,259318	FR	FR	FR	FR	FR	FR	FR	FR
2006	9	3	246.977.841	246,977841	-399,8	-9	-54,8	403,64	7,4	15,4	8	
2006	9	24	267.252.229	267,252229	FR	FR	FR	FR	FR	FR	FR	FR
2006	10	1	274.367.807	274,367807	FR	FR	FR	FR	FR	FR	FR	FR
2006	10	7	280.829.475	280,829475	FR	FR	FR	FR	FR	FR	FR	FR
2006	12	14	348.577.741	348,577741	-596,2	-17,8	-0,7	596,47	1,9	3,9	2	
2006	12	16	350.722.969	350,722969	-564,1	10,7	5,4	564,23	1,7	9,7	8	
											0	
2007	3	25	84.187.757	84,187757	SR	SR	SR	SR	SR	SR	SR	SR

Tablo 1'in devamı												
2007	5	7	127.456.470	127,456470	FR	FR	FR	FR	FR	FR	FR	FR
2007	7	20	201.484.153	201,484153	SR	SR	SR	SR	SR	SR	SR	SR
2007	7	23	204.826.763	204,826763	-370,4	-1,3	-39,5	372,50	4,1	7	2,9	SF
2007	7	27	208.165.438	208,165438	FR	FR	FR	FR	FR	FR	FR	
2007	8	26	238.753.649	238,753649	-383,9	18	-27,1	385,28	9,1	15,3	6,2	SF
2007	9	27	270.453.595	270,453595	-376,9	-35,5	6,6	378,63	4	11,3	7,3	
2007	10	25	298.800.526	298,800526	FR	FR	FR	FR	FR	FR	FR	FR
2007	11	12	316.892.775	316,892775	-384,3	-31,2	42,8	387,93	13,5	19,7	6,2	
2007	12	17	351.085.773	351,085773	-349,9	-19,3	39,5	352,65	9,2	16,6	7,4	
											0	
2008	1	6	6.238.262	6,238262	FR	FR	FR	FR	FR	FR	FR	FR
2008	6	15	167.048.877	167,048877	FR	FR	FR	FR	FR	FR	FR	FR
2008	7	12	194.369.882	194,369882	-545,8	52,4	-3,7	548,32	6,7	6,9	0,2	SF
2008	8	8	221.952.935	221,952935	-375,1	-7,9	-37,7	377,07	6,6	10,7	4,1	
2008	8	10	223.156.301	223,156301	FR	FR	FR	FR	FR	FR	FR	FR
2009	7	22	203.428.022	203,428022	FR	FR	FR	FR	FR	FR	FR	FR
											0	
2010	4	5	95.329.850	95,329850	-574,1	5,7	3,2	574,14	3	8,3	5,3	
2010	8	3	215.704.899	215,704899	-415,6	-29,1	4,9	416,65	4,6	10,9	6,3	
											0	
2011	6	7	158.381.291	158,381291	-390,7	9,3	-23,8	391,53	2,9	3,9	1	
2011	7	6	187.092.337	187,092337	-376,4	21,3	4,9	377,03	4,5	7	2,5	
2011	9	17	260.121.993	260,121993	-367,4	-39,4	22,7	370,20	3,9	7,6	3,7	
											0	
2012	1	2	2.040.698	2,040698	-357	15	-23,7	358,10	5	7,4	2,4	
2012	1	15	15.826.646	15,826646	SR	SR	SR	SR	SR	SR	SR	SR
2012	3	12	72.362.222	72,362222	-429,9	-39,1	4,7	431,70	10,6	34,7	24,1	
2012	6	30	182.670.388	182,670388	FR	FR	FR	FR	FR	FR	FR	FR
2012	11	26	331.192.089	331,192089	-436,8	39,4	-36,5	440,09	2,5	4,5	2	
2012	12	14	349.785.539	349,785539	-325,6	16,5	-14,3	326,33	5,6	12,2	6,6	
											0	
2013	1	19	19.698.681	19,698681	-383,7	21,8	-11,4	384,49	4,7	13,9	9,2	
											0	
2014	1	7	7.600.984	7,600984	-347,50	-3,10	13,00	347,76	4,10	10,50	6,4	
2014	1	9	9.813.251	9,813251	-388,60	40,30	-15,10	390,98	2,90	5,80	2,9	
2014	2	17	48.214.977	48,214977	FR	FR	FR	FR	FR	FR	FR	FR
2014	2	19	50.130.533	50,130533	-382,40	-15,60	13,70	382,96	1,80	3,40	1,6	
2014	2	19	50.130.533	50,130533	-351,70	-35,90	10,80	353,69	15,50	35,20	19,7	
2014	2	27	58.671.991	58,671991	-382,40	-15,60	13,70	382,96	1,80	3,40	1,6	
2014	2	27	58.671.991	58,671991	-351,70	-35,90	10,80	353,69	15,50	35,20	19,7	

Tablo 1'in devamı											
2014	3	25	84.808.982	84,808982	-376,20	-52,30	12,00	380,01	3,50	9,80	6,3
2014	4	19	109.745.232	109,745232	-475,30	-11,10	-3,30	475,44	5,80	8,70	2,9
2014	5	7	127.897.790	127,897790	-330,40	4,40	1,50	330,43	3,90	8,80	4,9

EK 2. Model ile Alınan Sonuçlar

EK Tablo 2

1998								DOY	n2ref	DOY	n2ref
								49,32848	32,20000	63,45699	8,30000
								n1	u1	n1	u1
			Re1=1e13	Re1=1e13	Re1=1e13	Re1=1e13	Re1=1e13	21,60000	377,86912	4,40000	352,27469
step	Mach	Re2/Re1	M2/M1	Kappa	U2/U1	S2-S1	Cs2^2/Cs1^2	n2	u2	n2	u2
1,00000	1,15000	1,77820	0,76312	1,22383	0,81711	0,02571	1,14650	26,43470	308,75978	5,38485	287,84638
2,00000	1,20000	1,70411	0,70520	1,29730	0,77083	0,05550	1,19479	28,02162	291,27411	5,70811	271,54508
3,00000	1,30000	1,57303	0,61033	1,44136	0,69379	0,15718	1,29218	31,13348	262,16067	6,34200	244,40360
4,00000	1,40000	1,46067	0,53626	1,58065	0,63265	0,31681	1,39184	34,14194	239,06005	6,95484	222,86766
5,00000	1,50000	1,36329	0,47712	1,71429	0,58333	0,53199	1,49479	37,02857	220,42365	7,54286	205,49357
6,00000	1,60000	1,27808	0,42902	1,84173	0,54297	0,79777	1,60176	39,78129	205,17112	8,10360	191,27415
7,00000	1,70000	1,20290	0,38927	1,96265	0,50952	1,10824	1,71325	42,39321	192,53020	8,63565	179,48944
8,00000	1,80000	1,13608	0,35596	2,07692	0,48148	1,45739	1,82963	44,86154	181,93698	9,13846	169,61374
9,00000	1,90000	1,07628	0,32771	2,18457	0,45776	1,83948	1,95119	47,18669	172,97194	9,61210	161,25594
10,00000	2,00000	1,02247	0,30349	2,28571	0,43750	2,24924	2,07812	49,37143	165,31774	10,05714	154,12018
11,00000	2,10000	0,97378	0,28253	2,38057	0,42007	2,68195	2,21061	51,42024	158,73073	10,47449	147,97934
12,00000	2,20000	0,92952	0,26424	2,46939	0,40496	3,13341	2,34876	53,33878	153,02138	10,86531	142,65669
13,00000	2,30000	0,88910	0,24815	2,55247	0,39178	3,59997	2,49268	55,13341	148,04041	11,23088	138,01310
14,00000	2,40000	0,85206	0,23389	2,63014	0,38021	4,07845	2,64245	56,81096	143,66899	11,57260	133,93777
15,00000	2,50000	0,81797	0,22119	2,70270	0,37000	4,56609	2,79812	58,37838	139,81157	11,89189	130,34164
16,00000	2,60000	0,78651	0,20980	2,77049	0,36095	5,06053	2,95976	59,84262	136,39063	12,19016	127,15240
17,00000	2,70000	0,75738	0,19954	2,83382	0,35288	5,55974	3,12740	61,21050	133,34270	12,46880	124,31093
18,00000	2,80000	0,73033	0,19025	2,89299	0,34566	6,06199	3,30108	62,48856	130,61547	12,72915	121,76842
19,00000	2,90000	0,70515	0,18180	2,94829	0,33918	6,56580	3,48083	63,68309	128,16548	12,97248	119,48437
20,00000	3,00000	0,68165	0,17408	3,00000	0,33333	7,06992	3,66667	64,80000	125,95637	13,20000	117,42490
21,00000	3,10000	0,65966	0,16700	3,04837	0,32804	7,57329	3,85861	65,84489	123,95759	13,41285	115,56150
22,00000	3,20000	0,63904	0,16049	3,09366	0,32324	8,07502	4,05669	66,82296	122,14324	13,61208	113,87004
23,00000	3,30000	0,61968	0,15448	3,13607	0,31887	8,57435	4,26091	67,73909	120,49132	13,79870	112,33002
24,00000	3,40000	0,60145	0,14891	3,17582	0,31488	9,07066	4,47128	68,59780	118,98301	13,97363	110,92387
25,00000	3,50000	0,58427	0,14374	3,21311	0,31122	9,56342	4,68782	69,40328	117,60212	14,13770	109,63651
26,00000	3,60000	0,56804	0,13893	3,24812	0,30787	10,05221	4,91053	70,15940	116,33471	14,29173	108,45494
27,00000	3,70000	0,55269	0,13444	3,28101	0,30478	10,53666	5,13943	70,86974	115,16866	14,43643	107,36787
28,00000	3,80000	0,53814	0,13024	3,31193	0,30194	11,01648	5,37452	71,53761	114,09345	14,57248	106,36549
29,00000	3,90000	0,52434	0,12630	3,34102	0,29931	11,49146	5,61580	72,16606	113,09988	14,70049	105,43922
30,00000	4,00000	0,51123	0,12260	3,36842	0,29687	11,96141	5,86328	72,75789	112,17989	14,82105	104,58155
31,00000	4,10000	0,49876	0,11912	3,39425	0,29462	12,42618	6,11697	73,31570	111,32640	14,93468	103,78587
32,00000	4,20000	0,48689	0,11584	3,41860	0,29252	12,88568	6,37687	73,84186	110,53314	15,04186	103,04634
33,00000	4,30000	0,47557	0,11273	3,44160	0,29056	13,33983	6,64298	74,33858	109,79458	15,14304	102,35780
34,00000	4,40000	0,46476	0,10980	3,46333	0,28874	13,78858	6,91532	74,80787	109,10580	15,23864	101,71568
35,00000	4,50000	0,45443	0,10702	3,48387	0,28704	14,23192	7,19387	75,25161	108,46243	15,32903	101,11588
36,00000	4,60000	0,44455	0,10438	3,50331	0,28544	14,66983	7,47864	75,67152	107,86056	15,41457	100,55478
37,00000	4,70000	0,43509	0,10187	3,52172	0,28395	15,10233	7,76964	76,06919	107,29670	15,49558	100,02911
38,00000	4,80000	0,42603	0,09948	3,53917	0,28255	15,52944	8,06686	76,44608	106,76771	15,57235	99,53595
39,00000	4,90000	0,41733	0,09721	3,55572	0,28124	15,95120	8,37032	76,80355	106,27077	15,64517	99,07267
40,00000	5,00000	0,40899	0,09504	3,57143	0,28000	16,36765	8,68000	77,14286	105,80335	15,71429	98,63691
41,00000	5,10000	0,40097	0,09297	3,58635	0,27884	16,77884	8,99592	77,46515	105,36316	15,77994	98,22654
42,00000	5,20000	0,39326	0,09099	3,60053	0,27774	17,18483	9,31807	77,77150	104,94812	15,84234	97,83961
43,00000	5,30000	0,38584	0,08909	3,61402	0,27670	17,58569	9,64645	78,06291	104,55634	15,90170	97,47437
44,00000	5,40000	0,37869	0,08727	3,62687	0,27572	17,98149	9,98107	78,34030	104,18614	15,95821	97,12924
45,00000	5,50000	0,37181	0,08553	3,63910	0,27479	18,37230	10,32193	78,60451	103,83594	16,01203	96,80276
46,00000	5,60000	0,36517	0,08386	3,65076	0,27392	18,75819	10,66902	78,85634	103,50433	16,06333	96,49361
47,00000	5,70000	0,35876	0,08225	3,66188	0,27308	19,13925	11,02235	79,09653	103,19002	16,11226	96,20059
48,00000	5,80000	0,35258	0,08071	3,67249	0,27229	19,51555	11,38193	79,32576	102,89183	16,15895	95,92260
49,00000	5,90000	0,34660	0,07923	3,68262	0,27155	19,88717	11,74774	79,54467	102,60867	16,20354	95,65862
50,00000	6,00000	0,34082	0,07780	3,69231	0,27083	20,25419	12,11979	79,75385	102,33955	16,24615	95,40773
51,00000	6,10000	0,33524	0,07642	3,70157	0,27016	20,61669	12,49809	79,95384	102,08356	16,28689	95,16908
52,00000	6,20000	0,32983	0,07509	3,71042	0,26951	20,97476	12,88262	80,14517	101,83986	16,32587	94,94188
53,00000	6,30000	0,32459	0,07381	3,71890	0,26890	21,32847	13,27340	80,32832	101,60766	16,36318	94,72541
54,00000	6,40000	0,31952	0,07257	3,72702	0,26831	21,67791	13,67042	80,50373	101,38627	16,39891	94,51902
55,00000	6,50000	0,31461	0,07137	3,73481	0,26775	22,02315	14,07369	80,67182	101,17502	16,43315	94,32207
56,00000	6,60000	0,30984	0,07022	3,74227	0,26722	22,36427	14,48320	80,83299	100,97329	16,46598	94,13401
57,00000	6,70000	0,30521	0,06910	3,74943	0,26671	22,70136	14,89895	80,98760	100,78053	16,49747	93,95431
58,00000	6,80000	0,30073	0,06801	3,75630	0,26622	23,03447	15,32095	81,13599	100,59621	16,52770	93,78247
59,00000	6,90000	0,29637	0,06697	3,76289	0,26575	23,36370	15,74919	81,27848	100,41985	16,55673	93,61805
60,00000	7,00000	0,29213	0,06595	3,76923	0,26531	23,68912	16,18367	81,41538	100,25099	16,58462	93,46063

EK Tablo 2 Devamı

DOY	n2ref	DOY	n2ref	DOY	n2ref	DOY	n2ref	DOY	n2ref	DOY	n2ref
113,72803	41,10000	120,36358	50,50000	121,89061	15,40000	123,70857	12,80000	128,38986	9,80000	135,58152	34,70000
n1	u1	n1	u1	n1	u1	n1	u1	n1	u1	n1	u1
11,70000	323,40269	9,00000	307,47628	5,30000	497,82677	4,20000	429,26089	5,70000	533,53645	9,40000	307,63493
n2	u2	n2	u2	n2	u2	n2	u2	n2	u2	n2	u2
14,31880	264,25484	11,01446	251,24125	6,48629	406,77811	5,14008	350,75240	6,97582	435,95677	11,50399	251,37089
15,17838	249,28957	11,67568	237,01296	6,87568	383,74147	5,44865	330,88860	7,39459	411,26768	12,19459	237,13526
16,86397	224,37258	12,97228	213,32304	7,63923	345,38573	6,05373	297,81562	8,21578	370,16064	13,54883	213,43311
18,49355	204,60170	14,22581	194,52581	8,37742	314,95163	6,63871	271,57321	9,00968	337,54347	14,85806	194,62618
20,05714	188,65157	15,42857	179,36116	9,08571	290,39895	7,20000	250,40218	9,77143	311,22959	16,11429	179,45371
21,54820	175,59755	16,57554	166,95001	9,76115	270,30438	7,73525	233,07525	10,49784	289,69362	17,31223	167,03615
22,96299	164,77871	17,66384	156,66395	10,40204	253,65049	8,24312	218,71511	11,18710	271,84513	18,44890	156,74479
24,30000	155,71241	18,69231	148,04413	11,00769	239,69437	8,72308	206,68117	11,83846	256,88792	19,52308	148,12052
25,55946	148,03960	19,66112	140,74918	11,57821	227,88331	9,17519	196,49685	12,45204	244,22963	20,53495	140,82181
26,74286	141,48868	20,57143	134,52087	12,11429	217,79921	9,60000	187,80164	13,02857	233,42220	21,48571	134,59028
27,85263	135,85113	21,42510	129,16095	12,61700	209,12111	9,99838	180,31877	13,56923	224,12160	22,37733	129,22760
28,89184	130,96473	22,22449	124,51519	13,08776	201,59927	10,37143	173,83292	14,07551	216,06021	23,21224	124,57943
29,86393	126,70172	22,97226	120,46211	13,52811	195,03705	10,72039	168,17452	14,54910	209,02728	23,99324	120,52427
30,77260	122,96040	23,67123	116,90504	13,93973	189,27789	11,04658	163,20857	14,99178	202,85500	24,72329	116,96536
31,62162	119,65900	24,32432	113,76622	14,32432	184,19590	11,35135	158,82653	15,40541	197,40849	25,40541	113,82492
32,41475	116,73115	24,93443	110,98256	14,68361	179,68895	11,63607	154,94032	15,79180	192,57824	26,04262	111,03983
33,15569	114,12255	25,50437	108,50243	15,01924	175,67344	11,90204	151,47786	16,15277	188,27469	26,63790	108,55842
33,84797	111,78843	26,03690	106,28325	15,33284	172,08043	12,15055	148,37972	16,49004	184,42395	27,19410	106,33809
34,49500	109,69158	26,53462	104,28966	15,62594	168,85266	12,38282	145,59651	16,80526	180,96465	27,71394	104,34348
35,10000	107,80090	27,00000	102,49209	15,90000	165,94226	12,60000	143,08696	17,10000	177,84548	28,20000	102,54498
35,66598	106,09022	27,43537	100,86566	16,15638	163,30894	12,80317	140,81633	17,37573	175,02327	28,65472	100,91770
36,19577	104,53739	27,84290	99,38930	16,39637	160,91861	12,99335	138,75523	17,63384	172,46149	29,08036	99,44059
36,69201	103,12359	28,22462	98,04512	16,62117	158,74228	13,17149	136,87864	17,87559	170,12905	29,47905	98,09571
37,15714	101,83268	28,58242	96,81779	16,83187	156,75514	13,33846	135,16519	18,10220	167,99937	29,85275	96,86775
37,59344	100,65084	28,91803	95,69415	17,02951	154,93588	13,49508	133,59650	18,31475	166,04961	30,20328	95,74352
38,00301	99,56611	29,23308	94,66283	17,21504	153,26611	13,64211	132,15671	18,51429	164,26006	30,53233	94,71168
38,38778	98,56813	29,52906	93,71401	17,38933	151,72989	13,78023	130,83207	18,70174	162,61365	30,84146	93,76236
38,74954	97,64790	29,80734	92,83910	17,55321	150,31335	13,91009	129,61063	18,87798	161,09549	31,13211	92,88700
39,08995	96,79755	30,06919	92,03062	17,70741	149,00436	14,03229	128,48193	19,04382	159,69261	31,40560	92,07811
39,41053	96,01017	30,31579	91,28202	17,85263	147,79232	14,14737	127,43683	19,20000	158,39363	31,66316	91,32912
39,71267	95,27970	30,54821	90,58752	17,98950	146,66788	14,25583	126,46725	19,34720	157,18853	31,90591	90,63426
39,99767	94,60079	30,76744	89,94204	18,11860	145,62280	14,35814	125,56611	19,48605	156,06848	32,13488	89,98845
40,26673	93,96868	30,97441	89,34106	18,24048	144,64977	14,45472	124,72710	19,61712	155,02567	32,35105	89,38716
40,52093	93,37919	31,16995	88,78060	18,35564	143,74234	14,54597	123,94465	19,74097	154,05314	32,55528	88,82641
40,76129	92,82855	31,35484	88,25708	18,46452	142,89472	14,63226	123,21377	19,85806	153,14472	32,74839	88,30262
40,98874	92,31343	31,52980	87,76733	18,56755	142,10178	14,71391	122,53005	19,96887	152,29490	32,93113	87,81262
41,20415	91,83085	31,69550	87,30851	18,66513	141,35891	14,79123	121,88949	20,07381	151,49875	33,10418	87,35356
41,40829	91,37810	31,85253	86,87806	18,75760	140,66199	14,86452	121,28856	20,17327	150,75183	33,26820	86,92289
41,60193	90,95280	32,00148	86,47370	18,84532	140,00730	14,93402	120,72404	20,26760	150,05018	33,42377	86,51832
41,78571	90,55275	32,14286	86,09336	18,92857	139,39149	15,00000	120,19305	20,35714	149,39021	33,57143	86,13778
41,96029	90,17601	32,27715	85,73517	19,00765	138,81156	15,06267	119,69299	20,44219	148,76867	33,71169	85,77941
42,12623	89,82079	32,40479	85,39744	19,08282	138,26476	15,12224	119,22150	20,52304	148,18264	33,84501	85,44151
42,28408	89,48549	32,52621	85,07865	19,15433	137,74861	15,17890	118,77644	20,59994	147,62948	33,97182	85,12255
42,43433	89,16864	32,64179	84,77741	19,22239	137,26088	15,23284	118,35588	20,67313	147,10676	34,09254	84,82115
42,57744	88,86892	32,75188	84,49245	19,28722	136,79950	15,28421	117,95805	20,74286	146,61229	34,20752	84,53604
42,71385	88,58511	32,85681	84,22262	19,34901	136,36263	15,33318	117,58135	20,80931	146,14407	34,31711	84,26607
42,84396	88,31611	32,95689	83,96686	19,40795	135,94854	15,37988	117,22429	20,87270	145,70028	34,42164	84,01019
42,96812	88,06090	33,05240	83,72422	19,46419	135,55568	15,42445	116,88555	20,93319	145,27925	34,52140	83,76742
43,08670	87,81856	33,14361	83,49381	19,51791	135,18263	15,46702	116,56388	20,99095	144,87944	34,61666	83,53689
43,20000	87,58823	33,23077	83,27482	19,56923	134,82808	15,50769	116,25816	21,04615	144,49945	34,70769	83,31779
43,30833	87,36914	33,31410	83,06652	19,61830	134,49082	15,54658	115,96735	21,09893	144,13800	34,79473	83,10938
43,41197	87,16056	33,39382	82,86822	19,66525	134,16975	15,58378	115,69050	21,14942	143,79390	34,87799	82,91097
43,51117	86,96183	33,47013	82,67928	19,71019	133,86385	15,61940	115,42673	21,19775	143,46606	34,95770	82,72194
43,60619	86,77235	33,54322	82,49913	19,75323	133,57217	15,65350	115,17522	21,24404	143,15346	35,03403	82,54170
43,69724	86,59155	33,61326	82,32723	19,79448	133,29385	15,68619	114,93524	21,28840	142,85517	35,10718	82,36971
43,78454	86,41890	33,68041	82,16308	19,83402	133,02809	15,71753	114,70608	21,33093	142,57035	35,17732	82,20548
43,86828	86,25393	33,74483	82,00623	19,87196	132,77414	15,74759	114,48710	21,37173	142,29818	35,24460	82,04855
43,94866	86,09617	33,80666	81,85625	19,90837	132,53130	15,77644	114,27771	21,41089	142,03793	35,30918	81,89849
44,02584	85,94523	33,86603	81,71274	19,94333	132,29895	15,80415	114,07737	21,44849	141,78891	35,37119	81,75490
44,10000	85,80071	33,92308	81,57534	19,97692	132,07649	15,83077	113,88554	21,48462	141,55049	35,43077	81,61743

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DOY	n2ref	DOY	n2ref	DOY	n2ref	DOY	n2ref	DOY	n2ref	DOY	n2ref
149,62742	15,80000	164,78869	17,20000	176,65498	22,60000	186,13609	10,20000	212,38550	10,10000	218,28067	27,60000
n1	u1	n1	u1	n1	u1	n1	u1	n1	u1	n1	u1
8,70000	526,99782	3,90000	307,59397	13,10000	396,06385	6,10000	443,61048	6,20000	410,89074	12,10000	370,47541
n2	u2	n2	u2	n2	u2	n2	u2	n2	u2	n2	u2
10,64731	430,61400	4,77293	251,33742	16,03216	323,62684	7,46536	362,47756	7,58774	335,74201	14,80833	302,71833
11,28649	406,22748	5,05946	237,10368	16,99459	305,29921	7,91351	341,94975	8,04324	316,72828	15,69730	285,57480
12,53987	365,62423	5,62132	213,40469	18,88188	274,78394	8,79232	307,77118	8,93646	285,07065	17,44051	257,03102
13,75161	333,40678	6,16452	194,60027	20,70645	250,57100	9,64194	280,65153	9,80000	259,95128	19,12581	234,38240
14,91429	307,41539	6,68571	179,42982	22,45714	231,03724	10,45714	258,77278	10,62857	239,68626	20,74286	216,11066
16,02302	286,14335	7,18273	167,01391	24,12662	215,05029	11,23453	240,86663	11,41871	223,10083	22,28489	201,15657
17,07504	268,51359	7,65433	156,72392	25,71070	201,80070	11,97216	226,02645	12,16842	209,35523	23,74805	188,76299
18,06923	253,73969	8,10000	148,10080	27,20769	190,69741	12,66923	213,59023	12,87692	197,83628	25,13077	178,37705
19,00575	241,23654	8,51982	140,80306	28,61785	181,30069	13,32587	203,06546	13,54433	188,08780	26,43328	169,58743
19,88571	230,56155	8,91429	134,57236	29,94286	173,27793	13,94286	194,07959	14,17143	179,76470	27,65714	162,08299
20,71093	221,37493	9,28421	129,21039	31,18543	166,37376	14,52146	186,34658	14,75951	172,60206	28,80486	155,62487
21,48367	213,41234	9,63061	124,56285	32,34898	160,38949	15,06327	179,64391	15,31020	166,39377	29,87959	150,02723
22,20651	206,46559	9,95464	120,50822	33,43739	155,16868	15,57008	173,79636	15,82533	160,97752	30,88492	145,14372
22,88219	200,36896	10,25753	116,94979	34,45479	150,58677	16,04384	168,66440	16,30685	156,22408	31,82466	140,85784
23,51351	194,98919	10,54054	113,80977	35,40541	146,54362	16,48649	164,13588	16,75676	152,02957	32,70270	137,07590
24,10328	190,21815	10,80492	111,02504	36,29344	142,95796	16,90000	160,11976	17,17705	148,30968	33,52295	133,72189
24,65423	185,96734	11,05190	108,54396	37,12303	139,76327	17,28630	156,54156	17,56968	144,99539	34,28921	130,73361
25,16900	182,16379	11,28266	106,32394	37,89815	136,90472	17,64723	153,33985	17,93653	142,02983	35,00517	128,05974
25,65013	178,74688	11,49833	104,32958	38,62261	134,33676	17,98457	150,46360	18,27940	139,36574	35,67432	125,65768
26,10000	175,66594	11,70000	102,53132	39,30000	132,02128	18,30000	147,87016	18,60000	136,96358	36,30000	123,49180
26,52086	172,87832	11,88866	100,90427	39,93370	129,92625	18,59508	145,52363	18,89992	134,79012	36,88533	121,53213
26,91480	170,34793	12,06526	99,42735	40,52689	128,02454	18,87130	143,39362	19,18066	132,81722	37,43323	119,75328
27,28380	168,04407	12,23067	98,08265	41,08251	126,29309	19,13002	141,45431	19,44363	131,02095	37,94644	118,13369
27,62967	165,94049	12,38571	96,85485	41,60330	124,71215	19,37253	139,68358	19,69011	129,38082	38,42747	116,65489
27,95410	164,01463	12,53115	95,73078	42,09180	123,26477	19,60000	138,06245	19,92131	127,87926	38,87869	115,30102
28,25865	162,24701	12,66767	94,69907	42,55038	121,93632	19,81353	136,57452	20,13835	126,50108	39,30226	114,05840
28,54476	160,62077	12,79593	93,74988	42,98119	120,71413	20,01414	135,20561	20,34224	125,23313	39,70018	112,91517
28,81376	159,12122	12,91651	92,87463	43,38624	119,58714	20,20275	133,94333	20,53394	124,06396	40,07431	111,86100
29,06689	157,73554	13,02998	92,06585	43,76738	118,54574	20,38023	132,77690	20,71433	122,98357	40,42636	110,88687
29,30526	156,45248	13,13684	91,31696	44,12632	117,58145	20,54737	131,69686	20,88421	121,98319	40,75789	109,98489
29,52993	155,26215	13,23756	90,62220	44,46461	116,68686	20,70490	130,69488	21,04432	121,05511	41,07037	109,14809
29,74186	154,15582	13,33256	89,97647	44,78372	115,85541	20,85349	129,76361	21,19535	120,19253	41,36512	108,37036
29,94193	153,12579	13,42224	89,37526	45,08497	115,08129	20,99376	128,89656	21,33792	119,38943	41,64337	107,64625
30,13095	152,16518	13,50698	88,81458	45,36959	114,35934	21,12630	128,08794	21,47263	118,64046	41,90626	106,97095
30,30968	151,26789	13,58710	88,29086	45,63871	113,68499	21,25161	127,33264	21,60000	117,94086	42,15484	106,34016
30,47881	150,42849	13,66291	87,80093	45,89338	113,05414	21,37020	126,62605	21,72053	117,28639	42,39007	105,75007
30,63898	149,64209	13,73472	87,34193	46,13456	112,46313	21,48250	125,96409	21,83468	116,67325	42,61283	105,19724
30,79078	148,90433	13,80276	86,91132	46,36313	111,90866	21,58894	125,34307	21,94286	116,09803	42,82396	104,67860
30,93476	148,21128	13,86731	86,50680	46,57993	111,38780	21,68989	124,75967	22,04546	115,55767	43,02421	104,19139
31,07143	147,55939	13,92857	86,12631	46,78571	110,89788	21,78571	124,21094	22,14286	115,04941	43,21429	103,73312
31,20124	146,94547	13,98676	85,76798	46,98118	110,43649	21,87673	123,69416	22,23537	114,57075	43,39483	103,30153
31,32463	146,36663	14,04208	85,43013	47,16698	110,00146	21,96325	123,20691	22,32330	114,11943	43,56644	102,89461
31,44201	145,82024	14,09469	85,11122	47,34371	109,59082	22,04555	122,74697	22,40695	113,69342	43,72969	102,51051
31,55373	145,30393	14,14478	84,80986	47,51194	109,20279	22,12388	122,31236	22,48657	113,29086	43,88507	102,14754
31,66015	144,81552	14,19248	84,52479	47,67218	108,83573	22,19850	121,90123	22,56241	112,91006	44,03308	101,80419
31,76158	144,35304	14,23795	84,25485	47,82491	108,48815	22,26962	121,51193	22,63469	112,54947	44,17416	101,47907
31,85833	143,91469	14,28132	83,99900	47,97058	108,15871	22,33745	121,14294	22,70363	112,20770	44,30871	101,17092
31,95066	143,49881	14,32271	83,75627	48,10961	107,84616	22,40218	120,79287	22,76943	111,88345	44,43712	100,87856
32,03883	143,10390	14,36223	83,52577	48,24237	107,54937	22,46400	120,46044	22,83227	111,57554	44,55975	100,60094
32,12308	142,72858	14,40000	83,30670	48,36923	107,26729	22,52308	120,14451	22,89231	111,28291	44,67692	100,33709
32,20363	142,37156	14,43611	83,09832	48,49052	106,99897	22,57956	119,84398	22,94971	111,00455	44,78896	100,08611
32,28069	142,03167	14,47066	82,89994	48,60656	106,74353	22,63359	119,55787	23,00463	110,73954	44,89614	99,84717
32,35446	141,70784	14,50372	82,71093	48,71764	106,50016	22,68531	119,28528	23,05720	110,48706	44,99874	99,61952
32,42511	141,39907	14,53540	82,53071	48,82402	106,26811	22,73485	119,02537	23,10755	110,24632	45,09700	99,40246
32,49282	141,10445	14,56575	82,35874	48,92597	106,04668	22,78232	118,77736	23,15580	110,01660	45,19116	99,19534
32,55773	140,82311	14,59485	82,19453	49,02371	105,83524	22,82784	118,54054	23,20206	109,79725	45,28144	98,99756
32,62000	140,55427	14,62276	82,03762	49,11748	105,63320	22,87150	118,31425	23,24644	109,58764	45,36805	98,80857
32,67977	140,29721	14,64955	81,88758	49,20747	105,44001	22,91340	118,09786	23,28903	109,38722	45,45118	98,62786
32,73717	140,05125	14,67528	81,74402	49,29389	105,25515	22,95365	117,89081	23,32993	109,19544	45,53100	98,45495
32,79231	139,81575	14,70000	81,60656	49,37692	105,07816	22,99231	117,69258	23,36923	109,01183	45,60769	98,28939

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DOY	n2ref	DOY	n2ref	DOY	n2ref	DOY	n2ref	DOY	n2ref	DOY	n2ref
222,00456	9,70000	227,49862	5,60000	238,26453	15,40000	267,96764	21,00000	275,28689	7,90000	291,79223	44,90000
n1	u1	n1	u1	n1	u1	n1	u1	n1	u1	n1	u1
4,80000	402,99301	2,80000	374,40676	4,90000	451,02338	9,90000	436,69441	3,70000	505,95421	17,80000	320,05514
n2	u2	n2	u2	n2	u2	n2	u2	n2	u2	n2	u2
5,87438	329,28872	3,42672	305,93066	5,99676	368,53470	12,11591	356,82639	4,52817	413,41910	21,78415	261,51953
6,22703	310,64045	3,63243	288,60521	6,35676	347,66386	12,84324	336,61861	4,80000	390,00637	23,09189	246,70917
6,91855	279,59131	4,03582	259,75853	7,06269	312,91415	14,26951	302,97290	5,33305	351,02444	25,65629	222,05009
7,58710	254,95476	4,42581	236,86958	7,74516	285,34132	15,64839	276,27606	5,84839	320,09348	28,13548	202,48386
8,22857	235,07926	4,80000	218,40394	8,40000	263,09697	16,97143	254,73841	6,34286	295,13995	30,51429	186,69883
8,84029	218,81261	5,15683	203,29117	9,02446	244,89160	18,23309	237,11142	6,81439	274,71732	32,78273	173,77994
9,42071	205,33122	5,49542	190,76607	9,61698	229,80344	19,43022	222,50260	7,26180	257,79155	34,93514	163,07308
9,96923	194,03367	5,81538	180,26992	10,17692	217,15941	20,56154	210,26027	7,68462	243,60758	36,96923	154,10062
10,48593	184,47256	6,11679	171,38703	10,70439	206,45876	21,62723	199,89959	8,08290	231,60369	38,88533	146,50723
10,97143	176,30944	6,40000	163,80296	11,20000	197,32273	22,62857	191,05381	8,45714	221,35497	40,68571	140,02412
11,42672	169,28448	6,66559	157,27631	11,66478	189,46050	23,56761	183,44136	8,80810	212,53519	42,37409	134,44493
11,85306	163,19552	6,91429	151,61927	12,10000	182,64583	24,44694	176,84319	9,13673	204,89055	43,95510	129,60910
12,25187	157,88337	7,14692	146,68393	12,50712	176,70056	25,26948	171,08680	9,44415	198,22119	45,43402	125,39022
12,62466	153,22130	7,36438	142,35257	12,88767	171,48285	26,03836	166,03485	9,73151	192,36801	46,81644	121,68763
12,97297	149,10742	7,56757	138,53050	13,24324	166,87865	26,75676	161,57693	10,00000	187,20306	48,10811	118,42040
13,29836	145,45902	7,75738	135,14090	13,57541	162,79542	27,42787	157,62343	10,25082	182,62252	49,31475	115,52286
13,60233	142,20844	7,93469	132,12090	13,88571	159,15743	28,05481	154,10101	10,48513	178,54145	50,44198	112,94127
13,88635	139,29988	8,10037	129,41866	14,17565	155,90221	28,64059	150,94922	10,70406	174,88978	51,49520	110,63130
14,15180	136,68699	8,25521	126,99111	14,44663	152,97791	29,18808	148,11781	10,90868	171,60932	52,47958	108,55616
14,40000	134,33100	8,40000	124,80225	14,70000	150,34113	29,70000	145,56480	11,10000	168,65140	53,40000	106,68505
14,63220	132,19932	8,53545	122,82178	14,93703	147,95538	30,17891	143,25485	11,27898	165,97509	54,26106	104,99207
14,84955	130,26434	8,66224	121,02406	15,15891	145,78978	30,62719	141,15806	11,44653	163,54574	55,06707	103,45532
15,05313	128,50259	8,78099	119,38728	15,36674	143,81806	31,04708	139,24898	11,60346	161,33388	55,82203	102,05615
15,24396	126,89399	8,89231	117,89279	15,56154	142,01774	31,44066	137,50585	11,75055	159,31430	56,52967	100,77861
15,42295	125,42130	8,99672	116,52455	15,74426	140,36952	31,80984	135,91000	11,88852	157,46534	57,19344	99,60900
15,59098	124,06961	9,09474	115,26875	15,91579	138,85674	32,15639	134,44527	12,01805	155,76831	57,81654	98,53549
15,74883	122,82603	9,18682	114,11338	16,07693	137,46494	32,48197	133,09769	12,13972	154,20701	58,40192	97,54785
15,89725	121,67933	9,27339	113,04802	16,22844	136,18157	32,78807	131,85510	12,25413	152,76734	58,95229	96,63715
16,03690	120,61970	9,35486	112,06356	16,37100	134,99566	33,07611	130,70686	12,36178	151,43698	59,47018	95,79560
16,16842	119,63855	9,43158	111,15201	16,50526	133,89757	33,34737	129,64365	12,46316	150,20516	59,95789	95,01637
16,29238	118,72831	9,50389	110,30633	16,63180	132,87884	33,60303	128,65729	12,55871	149,06236	60,41757	94,29346
16,40930	117,88231	9,57209	109,52034	16,75116	131,93201	33,84419	127,74054	12,64884	148,00021	60,85116	93,62157
16,51968	117,09464	9,63648	108,78855	16,86384	131,05047	34,07185	126,88701	12,73392	147,01130	61,26049	92,99601
16,62397	116,36007	9,69732	108,10608	16,97030	130,22834	34,28694	126,09100	12,81431	146,08905	61,64723	92,41261
16,72258	115,67392	9,75484	107,46861	17,07097	129,46041	34,49032	125,34747	12,89032	145,22760	62,01290	91,86768
16,81589	115,03203	9,80927	106,87225	17,16623	128,74202	34,68278	124,65190	12,96225	144,42171	62,35894	91,35789
16,90426	114,43068	9,86082	106,31355	17,25644	128,06900	34,86505	124,00026	13,03037	143,66672	62,68665	90,88030
16,98802	113,86652	9,90968	105,78941	17,34194	127,43760	35,03779	123,38892	13,09493	142,95842	62,99724	90,43225
17,06746	113,33654	9,95602	105,29703	17,42303	126,84446	35,20163	122,81462	13,15616	142,29304	63,29182	90,01134
17,14286	112,83804	10,00000	104,83389	17,50000	126,28655	35,35714	122,27444	13,21429	141,66718	63,57143	89,61544
17,21448	112,36858	10,04178	104,39773	17,57311	125,76113	35,50486	121,76571	13,26949	141,07777	63,83702	89,24259
17,28256	111,92594	10,08149	103,98649	17,64261	125,26574	35,64527	121,28606	13,32197	140,52205	64,08948	88,89105
17,34731	111,50812	10,11927	103,59831	17,70872	124,79812	35,77884	120,83330	13,37189	139,99748	64,32962	88,55922
17,40896	111,11330	10,15522	103,23149	17,77164	124,35624	35,90597	120,40546	13,41940	139,50178	64,55821	88,24565
17,46767	110,73982	10,18947	102,88450	17,83158	123,93824	36,02707	120,00074	13,46466	139,03287	64,77594	87,94904
17,52363	110,38616	10,22212	102,55593	17,88871	123,54244	36,14249	119,61751	13,50780	138,58886	64,98347	87,66816
17,57701	110,05095	10,25325	102,24450	17,94320	123,16728	36,25258	119,25427	13,54894	138,16801	65,18140	87,40195
17,62795	109,73294	10,28297	101,94905	17,99520	122,81136	36,35764	118,90966	13,58821	137,76874	65,37031	87,14938
17,67659	109,43095	10,31135	101,66848	18,04486	122,47338	36,45797	118,58242	13,62571	137,38960	65,55070	86,90954
17,72308	109,14394	10,33846	101,40183	18,09231	122,15217	36,55385	118,27140	13,66154	137,02926	65,72308	86,68160
17,76752	108,87093	10,36439	101,14818	18,13768	121,84661	36,64551	117,97556	13,69580	136,68650	65,88789	86,46477
17,81004	108,61102	10,38919	100,90671	18,18108	121,55573	36,73320	117,69392	13,72857	136,36019	66,04556	86,25836
17,85074	108,36339	10,41293	100,67665	18,22263	121,27858	36,81715	117,42558	13,75994	136,04929	66,19649	86,06169
17,88972	108,12728	10,43567	100,45728	18,26242	121,01433	36,89754	117,16972	13,78999	135,75285	66,34104	85,87417
17,92707	107,90198	10,45746	100,24796	18,30055	120,76218	36,97459	116,92557	13,81878	135,46999	66,47956	85,69524
17,96289	107,68684	10,47835	100,04809	18,33711	120,52140	37,04845	116,69245	13,84639	135,19988	66,61237	85,52438
17,99724	107,48126	10,49839	99,85709	18,37219	120,29132	37,11932	116,46968	13,87288	134,94179	66,73978	85,36111
18,03022	107,28469	10,51763	99,67446	18,40585	120,07132	37,18733	116,25667	13,89829	134,69499	66,86206	85,20499
18,06189	107,09660	10,53610	99,49972	18,43817	119,86081	37,25264	116,05285	13,92270	134,45884	66,97949	85,05561
18,09231	106,91651	10,55385	99,33241	18,46923	119,65926	37,31538	115,85770	13,94615	134,23275	67,09231	84,91259

EK Tablo 2 Devamı

DOY	n2ref	DOY	n2ref	DOY	n2ref	DOY	n2ref	DOY	n2ref	DOY	n2ref
296,52352	9,10000	311,31701	11,00000	312,18146	11,80000	316,27182	9,60000	355,95140	20,00000	362,73176	15,00000
n1	u1	n1	u1	n1	u1	n1	u1	n1	u1	n1	u1
3,60000	492,06502	6,10000	417,27679	5,30000	457,94223	5,60000	344,74554	12,70000	359,05779	10,30000	383,58763
n2	u2	n2	u2	n2	u2	n2	u2	n2	u2	n2	u2
4,40578	402,07014	7,46536	340,96010	6,48629	374,18815	6,85344	281,69426	15,54263	293,38891	12,60544	313,43243
4,67027	379,30012	7,91351	321,65086	6,87568	352,99714	7,26486	265,74136	16,47568	276,77372	13,36216	295,68213
5,18891	341,38830	8,79232	289,50121	7,63923	317,71436	8,07164	239,17997	18,30533	249,10962	14,84606	266,12810
5,69032	311,30644	9,64194	263,99144	8,37742	289,71856	8,85161	218,10432	20,07419	227,15901	16,28065	242,67789
6,17143	287,03793	10,45714	243,41146	9,08571	267,13297	9,60000	201,10157	21,77143	209,45038	17,65714	223,75945
6,63022	267,17593	11,23453	226,56826	9,76115	248,64832	10,31367	187,18606	23,38993	194,95716	18,96978	208,27610
7,06553	250,71479	11,97216	212,60902	10,40204	233,32870	10,99083	175,65322	24,92564	182,94554	20,21528	195,44387
7,47692	236,92019	12,66923	200,91105	11,00769	220,49071	11,63077	165,98860	26,37692	172,87968	21,39231	184,69034
7,86445	225,24583	13,32587	191,01105	11,57821	209,62591	12,23359	157,80942	27,74402	164,36094	22,50106	175,58963
8,22857	215,27844	13,94286	182,55860	12,11429	200,34973	12,80000	150,82618	29,02857	157,08779	23,54286	167,81959
8,57004	206,70078	14,52146	175,28464	12,61700	192,36689	13,33117	144,81658	30,23320	150,82870	24,51984	161,13290
8,88980	199,26600	15,06327	168,97986	13,08776	185,44768	13,82857	139,60770	31,36122	145,40357	25,43469	155,33714
9,18890	192,77973	15,57008	163,47942	13,52811	179,41121	14,29385	135,06335	32,41641	140,67056	26,29047	150,28079
9,46849	187,08722	16,04384	158,65211	13,93973	174,11345	14,72877	131,07513	33,40274	136,51677	27,09041	145,84321
9,72973	182,06406	16,48649	154,39241	14,32432	169,43863	15,13514	127,55585	34,32432	132,85138	27,83784	141,92742
9,97377	177,60927	16,90000	150,61470	14,68361	165,29276	15,51475	124,43478	35,18525	129,60074	28,53607	138,45471
10,20175	173,64023	17,28630	147,24891	15,01924	161,59896	15,86939	121,65403	35,98950	126,70455	29,18834	135,36066
10,41476	170,08880	17,64723	144,23726	15,33284	158,29381	16,20074	119,16587	36,74096	124,11309	29,79779	132,59215
10,61385	166,89839	17,98457	141,53175	15,62594	155,32464	16,51043	116,93064	37,44330	121,78506	30,36740	130,10508
10,80000	164,02167	18,30000	139,09226	15,90000	152,64741	16,80000	114,91518	38,10000	119,68593	30,90000	127,86254
10,97415	161,41883	18,59508	136,88502	16,15638	150,22507	17,07090	113,09161	38,71435	117,78665	31,39826	125,83351
11,13716	159,05617	18,87130	134,88146	16,39637	148,02625	17,32447	111,43630	39,28943	116,06263	31,86465	123,99170
11,28985	156,90503	19,13002	133,05727	16,62117	146,02428	17,56199	109,92919	39,82808	114,49295	32,30151	122,31479
11,43297	154,94089	19,37253	131,39165	16,83187	144,19634	17,78462	108,55310	40,33297	113,05972	32,71099	120,78365
11,56721	153,14268	19,60000	129,86676	17,02951	142,52284	17,99344	107,29326	40,80656	111,74758	33,09508	119,38186
11,69323	151,49224	19,81353	128,46716	17,21504	140,98685	18,18947	106,13694	41,25113	110,54326	33,45564	118,09527
11,81162	149,97380	20,01414	127,17950	17,38933	139,57370	18,37364	105,07310	41,66878	109,43526	33,79437	116,91157
11,92294	148,57365	20,20275	125,99216	17,55321	138,27065	18,54679	104,09214	42,06147	108,41357	34,11284	115,82009
12,02768	147,27981	20,38023	124,89498	17,70741	137,06654	18,70972	103,18567	42,43097	107,46947	34,41252	114,81148
12,12632	146,08180	20,54737	123,87905	17,85263	135,95160	18,86316	102,34633	42,77895	106,59528	34,69474	113,87758
12,21928	144,97037	20,70490	122,93654	17,98950	134,91725	19,00777	101,56766	43,10692	105,78428	34,96073	113,01117
12,30698	143,93739	20,85349	122,06056	18,11860	133,95589	19,14419	100,84393	43,41628	105,03051	35,21163	112,20591
12,38976	142,97562	20,99376	121,24497	18,24048	133,06082	19,27296	100,17012	43,70833	104,32872	35,44849	111,45617
12,46798	142,07869	21,12630	120,48436	18,35564	132,22609	19,39463	99,54171	43,98426	103,67423	35,67227	110,75697
12,54194	141,24088	21,25161	119,77389	18,46452	131,44638	19,50968	98,95474	44,24516	103,06289	35,88387	110,10386
12,61192	140,45712	21,37020	119,10925	18,56755	130,71697	19,61854	98,40563	44,49205	102,49098	36,08411	109,49288
12,67820	139,72285	21,48250	118,48659	18,66513	130,03362	19,72164	97,89119	44,72587	101,95518	36,27373	108,92048
12,74101	139,03400	21,58894	117,90243	18,75760	129,39253	19,81935	97,40857	44,94747	101,45253	36,45346	108,38348
12,80059	138,38688	21,68989	117,35367	18,84532	128,79029	19,91203	96,95520	45,15765	100,98033	36,62392	107,87903
12,85714	137,77820	21,78571	116,83750	18,92857	128,22383	20,00000	96,52875	45,35714	100,53618	36,78571	107,40454
12,91086	137,20498	21,87673	116,35140	19,00765	127,69035	20,08356	96,12715	45,54664	100,11790	36,93940	106,95768
12,96192	136,66451	21,96325	115,89307	19,08282	127,18736	20,16298	95,74848	45,72676	99,72352	37,08549	106,53636
13,01049	136,15434	22,04555	115,46044	19,15433	126,71257	20,23853	95,39106	45,89810	99,35125	37,22445	106,13866
13,05672	135,67225	22,12388	115,05163	19,22239	126,26391	20,31045	95,05330	46,06119	98,99947	37,35672	105,76284
13,10075	135,21621	22,19850	114,66490	19,28722	125,83950	20,37895	94,73380	46,21654	98,66671	37,48271	105,40734
13,14272	134,78439	22,26962	114,29871	19,34901	125,43762	20,44424	94,43126	46,36461	98,35161	37,60279	105,07072
13,18276	134,37510	22,33745	113,95163	19,40795	125,05671	20,50651	94,14450	46,50583	98,05295	37,71733	104,75165
13,22096	133,98679	22,40218	113,62234	19,46419	124,69533	20,56594	93,87245	46,64061	97,76960	37,82664	104,44895
13,25745	133,61806	22,46400	113,30965	19,51791	124,35217	20,62269	93,61411	46,76932	97,50054	37,93102	104,16151
13,29231	133,26761	22,52308	113,01246	19,56923	124,02602	20,67692	93,36858	46,89231	97,24482	38,03077	103,88832
13,32564	132,93425	22,57956	112,72978	19,61830	123,71578	20,72877	93,13503	47,00990	97,00157	38,12614	103,62845
13,35753	132,61690	22,63359	112,46065	19,66525	123,42044	20,77838	92,91269	47,12239	96,77000	38,21737	103,38106
13,38805	132,31453	22,68531	112,20425	19,71019	123,13904	20,82586	92,70085	47,23008	96,54937	38,30471	103,14535
13,41729	132,02623	22,73485	111,95976	19,75323	122,87073	20,87134	92,49887	47,33321	96,33899	38,38835	102,92061
13,44530	131,75114	22,78232	111,72648	19,79448	122,61471	20,91492	92,30613	47,43204	96,13826	38,46851	102,70616
13,47216	131,48845	22,82784	111,50372	19,83402	122,37024	20,95670	92,12209	47,52680	95,94657	38,54536	102,50138
13,49793	131,23743	22,87150	111,29085	19,87196	122,13663	20,99678	91,94622	47,61771	95,76341	38,61909	102,30570
13,52266	130,99741	22,91340	111,08731	19,90837	121,91325	21,03526	91,77806	47,70496	95,58827	38,68985	102,11859
13,54641	130,76775	22,95365	110,89256	19,94333	121,69952	21,07220	91,61716	47,78874	95,42068	38,75779	101,93956
13,56923	130,54786	22,99231	110,70609	19,97692	121,49488	21,10769	91,46310	47,86923	95,26023	38,82308	101,76815

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1999								DOY	n2ref	DOY	n2ref
								42,32541	24,70000	48,26651	12,10000
								n1	u1	n1	u1
			Re1=1e13	Re1=1e13	Re1=1e13	Re1=1e13	Re1=1e13	12,50000	374,94345	7,70000	460,62227
step	Mach	Re2/Re1	M2/M1	Kappa	U2/U1	S2-S1	Cs2^2/Cs1^2	n2	u2	n2	u2
1,00000	1,15000	1,77820	0,76312	1,22383	0,81711	0,02571	1,14650	15,29786	306,36920	9,42348	376,37803
2,00000	1,20000	1,70411	0,70520	1,29730	0,77083	0,05550	1,19479	16,21622	289,01891	9,98919	355,06300
3,00000	1,30000	1,57303	0,61033	1,44136	0,69379	0,15718	1,29218	18,01706	260,13088	11,09851	319,57374
4,00000	1,40000	1,46067	0,53626	1,58065	0,63265	0,31681	1,39184	19,75806	237,20912	12,17097	291,41409
5,00000	1,50000	1,36329	0,47712	1,71429	0,58333	0,53199	1,49479	21,42857	218,71701	13,20000	268,69633
6,00000	1,60000	1,27808	0,42902	1,84173	0,54297	0,79777	1,60176	23,02158	203,58258	14,18129	250,10350
7,00000	1,70000	1,20290	0,38927	1,96265	0,50952	1,10824	1,71325	24,53311	191,03953	15,11239	234,69422
8,00000	1,80000	1,13608	0,35596	2,07692	0,48148	1,45739	1,82963	25,96154	180,52833	15,99231	221,78110
9,00000	1,90000	1,07628	0,32771	2,18457	0,45776	1,83948	1,95119	27,30711	171,63270	16,82118	210,85272
10,00000	2,00000	1,02247	0,30349	2,28571	0,43750	2,24924	2,07812	28,57143	164,03776	17,60000	201,52225
11,00000	2,10000	0,97378	0,28253	2,38057	0,42007	2,68195	2,21061	29,75709	157,50175	18,33036	193,49269
12,00000	2,20000	0,92952	0,26424	2,46939	0,40496	3,13341	2,34876	30,86735	151,83660	19,01429	186,53299
13,00000	2,30000	0,88910	0,24815	2,55247	0,39178	3,59997	2,49268	31,90591	146,89420	19,65404	180,46118
14,00000	2,40000	0,85206	0,23389	2,63014	0,38021	4,07845	2,64245	32,87671	142,55662	20,25205	175,13243
15,00000	2,50000	0,81797	0,22119	2,70270	0,37000	4,56609	2,79812	33,78378	138,72908	20,81081	170,43024
16,00000	2,60000	0,78651	0,20980	2,77049	0,36095	5,06053	2,95976	34,63115	135,33462	21,33279	166,26011
17,00000	2,70000	0,75738	0,19954	2,83382	0,35288	5,55974	3,12740	35,42274	132,31029	21,82041	162,54469
18,00000	2,80000	0,73033	0,19025	2,89299	0,34566	6,06199	3,30108	36,16236	129,60418	22,27601	159,22020
19,00000	2,90000	0,70515	0,18180	2,94829	0,33918	6,56580	3,48083	36,85364	127,17315	22,70184	156,23366
20,00000	3,00000	0,68165	0,17408	3,00000	0,33333	7,06992	3,66667	37,50000	124,98115	23,10000	153,54076
21,00000	3,10000	0,65966	0,16700	3,04837	0,32804	7,57329	3,85861	38,10468	122,99784	23,47248	151,10424
22,00000	3,20000	0,63904	0,16049	3,09366	0,32324	8,07502	4,05669	38,67069	121,19754	23,82115	148,89255
23,00000	3,30000	0,61968	0,15448	3,13607	0,31887	8,57435	4,26091	39,20086	119,55841	24,14773	146,87887
24,00000	3,40000	0,60145	0,14891	3,17582	0,31488	9,07066	4,47128	39,69780	118,06178	24,45385	145,04023
25,00000	3,50000	0,58427	0,14374	3,21311	0,31122	9,56342	4,68782	40,16393	116,69158	24,74098	143,35693
26,00000	3,60000	0,56804	0,13893	3,24812	0,30787	10,05221	4,91053	40,60150	115,43398	25,01053	141,81195
27,00000	3,70000	0,55269	0,13444	3,28101	0,30478	10,53666	5,13943	41,01258	114,27696	25,26375	140,39054
28,00000	3,80000	0,53814	0,13024	3,31193	0,30194	11,01648	5,37452	41,39908	113,21007	25,50183	139,07986
29,00000	3,90000	0,52434	0,12630	3,34102	0,29931	11,49146	5,61580	41,76277	112,22420	25,72586	137,86870
30,00000	4,00000	0,51123	0,12260	3,36842	0,29687	11,96141	5,86328	42,10526	111,31134	25,93684	136,74724
31,00000	4,10000	0,49876	0,11912	3,39425	0,29462	12,42618	6,11697	42,42807	110,46445	26,13569	135,70683
32,00000	4,20000	0,48689	0,11584	3,41860	0,29252	12,88568	6,37687	42,73256	109,67734	26,32326	134,73985
33,00000	4,30000	0,47557	0,11273	3,44160	0,29056	13,33983	6,64298	43,02001	108,94449	26,50033	133,83954
34,00000	4,40000	0,46476	0,10980	3,46333	0,28874	13,78858	6,91532	43,29159	108,26105	26,66762	132,99992
35,00000	4,50000	0,45443	0,10702	3,48387	0,28704	14,23192	7,19387	43,54839	107,62266	26,82581	132,21565
36,00000	4,60000	0,44455	0,10438	3,50331	0,28544	14,66983	7,47864	43,79139	107,02545	26,97550	131,48197
37,00000	4,70000	0,43509	0,10187	3,52172	0,28395	15,10233	7,76964	44,02152	106,46595	27,11726	130,79462
38,00000	4,80000	0,42603	0,09948	3,53917	0,28255	15,52944	8,06686	44,23963	105,94105	27,25161	130,14978
39,00000	4,90000	0,41733	0,09721	3,55572	0,28124	15,95120	8,37032	44,44650	105,44797	27,37904	129,54402
40,00000	5,00000	0,40899	0,09504	3,57143	0,28000	16,36765	8,68000	44,64286	104,98417	27,50000	128,97424
41,00000	5,10000	0,40097	0,09297	3,58635	0,27884	16,77884	8,99592	44,82937	104,54738	27,61489	128,43764
42,00000	5,20000	0,39326	0,09099	3,60053	0,27774	17,18483	9,31807	45,00666	104,13555	27,72410	127,93170
43,00000	5,30000	0,38584	0,08909	3,61402	0,27670	17,58569	9,64645	45,17530	103,74681	27,82798	127,45413
44,00000	5,40000	0,37869	0,08727	3,62687	0,27572	17,98149	9,98107	45,33582	103,37947	27,92687	127,00285
45,00000	5,50000	0,37181	0,08553	3,63910	0,27479	18,37230	10,32193	45,48872	103,03198	28,02105	126,57596
46,00000	5,60000	0,36517	0,08386	3,65076	0,27392	18,75819	10,66902	45,63446	102,70294	28,11083	126,17173
47,00000	5,70000	0,35876	0,08225	3,66188	0,27308	19,13925	11,02235	45,77346	102,39107	28,19645	125,78859
48,00000	5,80000	0,35258	0,08071	3,67249	0,27229	19,51555	11,38193	45,90611	102,09518	28,27817	125,42509
49,00000	5,90000	0,34660	0,07923	3,68262	0,27155	19,88717	11,74774	46,03280	101,81422	28,35620	125,07992
50,00000	6,00000	0,34082	0,07780	3,69231	0,27083	20,25419	12,11979	46,15385	101,54718	28,43077	124,75187
51,00000	6,10000	0,33524	0,07642	3,70157	0,27016	20,61669	12,49809	46,26958	101,29317	28,50206	124,43981
52,00000	6,20000	0,32983	0,07509	3,71042	0,26951	20,97476	12,88262	46,38031	101,05136	28,57027	124,14274
53,00000	6,30000	0,32459	0,07381	3,71890	0,26890	21,32847	13,27340	46,48630	100,82096	28,63556	123,85969
54,00000	6,40000	0,31952	0,07257	3,72702	0,26831	21,67791	13,67042	46,58781	100,60128	28,69809	123,58981
55,00000	6,50000	0,31461	0,07137	3,73481	0,26775	22,02315	14,07369	46,68508	100,39166	28,75801	123,33230
56,00000	6,60000	0,30984	0,07022	3,74227	0,26722	22,36427	14,48320	46,77835	100,19150	28,81546	123,08639
57,00000	6,70000	0,30521	0,06910	3,74943	0,26671	22,70136	14,89895	46,86782	100,00023	28,87058	122,85142
58,00000	6,80000	0,30073	0,06801	3,75630	0,26622	23,03447	15,32095	46,95370	99,81734	28,92348	122,62673
59,00000	6,90000	0,29637	0,06697	3,76289	0,26575	23,36370	15,74919	47,03616	99,64234	28,97427	122,41175
60,00000	7,00000	0,29213	0,06595	3,76923	0,26531	23,68912	16,18367	47,11538	99,47479	29,02308	122,20591

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DOY	n2ref	DOY	n2ref	DOY	n2ref	DOY	n2ref	DOY	n2ref
49,08947	10,60000	69,02795	15,90000	106,44142	9,30000	125,62454	15,00000	138,00249	28,10000
n1	u1	n1	u1	n1	u1	n1	u1	n1	u1
3,90000	399,10481	10,30000	411,95053	4,70000	376,03189	4,80000	379,18586	8,30000	341,80010
n2	u2	n2	u2	n2	u2	n2	u2	n2	u2
4,77293	326,11163	12,60544	336,60797	5,75200	307,25857	5,87438	309,83571	10,15778	279,28751
5,05946	307,64329	13,36216	317,54520	6,09730	289,85791	6,22703	292,28910	10,76757	263,47091
5,62132	276,89372	14,84606	285,80592	6,77441	260,88603	6,91855	263,07422	11,96333	237,13646
6,16452	252,49488	16,28065	260,62176	7,42903	237,89772	7,58710	239,89310	13,11935	216,24088
6,68571	232,81114	17,65714	240,30448	8,05714	219,35193	8,22857	221,19175	14,22857	199,38339
7,18273	216,70144	18,96978	223,67626	8,65612	204,17356	8,84029	205,88607	15,28633	185,58677
7,65433	203,35012	20,21528	209,89521	9,22445	191,59410	9,42071	193,20110	16,28998	174,15247
8,10000	192,16158	21,39231	198,34655	9,76154	181,05239	9,96923	182,57097	17,23846	164,57042
8,51982	182,69271	22,50106	188,57292	10,26747	172,13094	10,48593	173,57469	18,13192	156,46113
8,91429	174,60835	23,54286	180,22836	10,74286	164,51395	10,97143	165,89382	18,97143	149,53754
9,28421	167,65117	24,51984	173,04725	11,18866	157,95897	11,42672	159,28386	19,75870	143,57929
9,63061	161,62096	25,43469	166,82294	11,60612	152,27738	11,85306	153,55461	20,49592	138,41492
9,95464	156,36006	26,29047	161,39272	11,99662	147,32062	12,25187	148,55628	21,18552	133,90940
10,25753	151,74297	27,09041	156,62702	12,36164	142,97046	12,62466	144,16963	21,83014	129,95525
10,54054	147,66878	27,83784	152,42170	12,70270	139,13180	12,97297	140,29877	22,43243	126,46604
10,80492	144,05558	28,53607	148,69220	13,02131	135,72749	13,29836	136,86590	22,99508	123,37163
11,05190	140,83637	29,18834	145,36937	13,31895	132,69438	13,60233	133,80736	23,52070	120,61465
11,28266	137,95587	29,79779	142,39617	13,59705	129,98041	13,88635	131,07062	24,01181	118,14774
11,49833	135,36819	30,36740	139,72519	13,85697	127,54233	14,15180	128,61209	24,47082	115,93160
11,70000	133,03494	30,90000	137,31684	14,10000	125,34396	14,40000	126,39529	24,90000	113,93337
11,88866	130,92382	31,39826	135,13778	14,32736	123,35489	14,63220	124,38954	25,30151	112,12537
12,06526	129,00751	31,86465	133,15979	14,54018	121,54937	14,84955	122,56887	25,67734	110,48421
12,23067	127,26276	32,30151	131,35888	14,73952	119,90548	15,05313	120,91120	26,02937	108,98998
12,38571	125,66968	32,71099	129,71453	14,92637	118,40450	15,24396	119,39763	26,35934	107,62564
12,53115	124,21119	33,09508	128,20909	15,10164	117,03033	15,42295	118,01193	26,66885	106,37656
12,66767	122,87255	33,45564	126,82736	15,26617	115,76908	15,59098	116,74009	26,95940	105,23012
12,79593	121,64097	33,79437	125,55614	15,42073	114,60870	15,74883	115,56998	27,23235	104,17538
12,91651	120,50533	34,11284	124,38396	15,56606	113,53871	15,89725	114,49102	27,48899	103,20280
13,02998	119,45593	34,41252	123,30078	15,70280	112,54998	16,03690	113,49399	27,73048	102,30407
13,13684	118,48424	34,69474	122,29781	15,83158	111,63447	16,16842	112,57080	27,95789	101,47191
13,23756	117,58278	34,96073	121,36734	15,95295	110,78512	16,29238	111,71434	28,17224	100,69988
13,33256	116,74494	35,21163	120,50254	16,06744	109,99572	16,40930	110,91831	28,37442	99,98234
13,42224	115,96488	35,44849	119,69736	16,17552	109,26075	16,51968	110,17718	28,56529	99,31428
13,50698	115,23739	35,67227	118,94646	16,27764	108,57532	16,62397	109,48600	28,74562	98,69125
13,58710	114,55786	35,88387	118,24506	16,37419	107,93508	16,72258	108,84039	28,91613	98,10929
13,66291	113,92217	36,08411	117,58890	16,46556	107,33613	16,81589	108,23642	29,07748	97,56487
13,73472	113,32662	36,27373	116,97418	16,55209	106,77501	16,90426	107,67059	29,23029	97,05483
13,80276	112,76790	36,45346	116,39748	16,63410	106,24859	16,98802	107,13976	29,37512	96,57633
13,86731	112,24303	36,62392	115,85573	16,71188	105,75407	17,06746	106,64109	29,51248	96,12683
13,92857	111,74935	36,78571	115,34615	16,78571	105,28893	17,14286	106,17204	29,64286	95,70403
13,98676	111,28442	36,93940	114,86625	16,85584	104,85088	17,21448	105,73031	29,76670	95,30585
14,04208	110,84605	37,08549	114,41378	16,92250	104,43785	17,28256	105,31383	29,88442	94,93043
14,09469	110,43226	37,22445	113,98667	16,98591	104,04798	17,34731	104,92069	29,99640	94,57605
14,14478	110,04124	37,35672	113,58307	17,04627	103,67957	17,40896	104,54919	30,10299	94,24118
14,19248	109,67136	37,48271	113,20128	17,10376	103,33108	17,46767	104,19777	30,20451	93,92441
14,23795	109,32112	37,60279	112,83977	17,15856	103,00108	17,52363	103,86501	30,30128	93,62445
14,28132	108,98915	37,71733	112,49711	17,21082	102,68830	17,57701	103,54960	30,39358	93,34015
14,32271	108,67420	37,82664	112,17202	17,26070	102,39156	17,62795	103,25037	30,48166	93,07042
14,36223	108,37513	37,93102	111,86333	17,30833	102,10978	17,67659	102,96623	30,56578	92,81429
14,40000	108,09089	38,03077	111,56994	17,35385	101,84197	17,72308	102,69617	30,64615	92,57086
14,43611	107,82051	38,12614	111,29085	17,39736	101,58722	17,76752	102,43929	30,72300	92,33930
14,47066	107,56311	38,21737	111,02517	17,43900	101,34470	17,81004	102,19473	30,79653	92,11886
14,50372	107,31787	38,30471	110,77203	17,47885	101,11364	17,85074	101,96173	30,86690	91,90883
14,53540	107,08403	38,38835	110,53067	17,51702	100,89332	17,88972	101,73957	30,93430	91,70857
14,56575	106,86090	38,46851	110,30036	17,55359	100,68309	17,92707	101,52758	30,99890	91,51748
14,59485	106,64784	38,54536	110,08044	17,58866	100,48235	17,96289	101,32515	31,06082	91,33501
14,62276	106,44425	38,61909	109,87030	17,62230	100,29053	17,99724	101,13172	31,12023	91,16065
14,64955	106,24957	38,68985	109,66936	17,65459	100,10710	18,03022	100,94676	31,17725	90,99393
14,67528	106,06330	38,75779	109,47709	17,68560	99,93160	18,06189	100,76978	31,23201	90,83440
14,70000	105,88495	38,82308	109,29300	17,71538	99,76356	18,09231	100,60033	31,28462	90,68166

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DOY	n2ref	DOY	n2ref	DOY	n2ref	DOY	n2ref	DOY	n2ref	DOY	n2ref	DOY	n2ref
216,05274	19,80000	220,73941	2,80000	227,40199	32,50000	234,95068	4,30000	235,47920	8,90000	294,06763	31,10000	301,47688	9,70000
n1	u1	n1	u1	n1	u1	n1	u1	n1	u1	n1	u1	n1	u1
5,80000	329,54723	1,70000	370,96590	12,20000	332,60917	2,50000	412,80689	7,20000	386,10513	10,40000	345,28300	5,70000	375,41835
n2	u2	n2	u2	n2	u2	n2	u2	n2	u2	n2	u2	n2	u2
7,09821	269,27560	2,08051	303,11911	14,93071	271,77753	3,05957	337,30771	8,81157	315,48949	12,72782	282,13342	6,97582	306,75725
7,52432	254,02599	2,20541	285,95288	15,82703	256,38624	3,24324	318,20531	9,34054	297,62270	13,49189	266,15565	7,39459	289,38498
8,35991	228,63558	2,45032	257,37131	17,58465	230,75991	3,60341	286,40005	10,37783	267,87471	14,99019	239,55285	8,21578	260,46037
9,16774	208,48907	2,68710	234,69271	19,28387	210,42621	3,95161	261,16354	11,38065	244,27059	16,43871	218,44435	9,00968	237,50957
9,94286	192,23589	2,91429	216,39678	20,91429	194,02202	4,28571	240,80402	12,34286	225,22799	17,82857	201,41508	9,77143	218,99404
10,68201	178,93385	3,13094	201,42289	22,46906	180,59639	4,60432	224,14124	13,26043	209,64302	19,15396	187,47788	10,49784	203,84043
11,38336	167,90945	3,33650	189,01290	23,94431	169,46955	4,90662	210,33154	14,13107	196,72657	20,41154	175,92706	11,18710	191,28150
12,04615	158,67089	3,53077	178,61321	25,33846	160,14516	5,19231	198,75887	14,95385	185,90247	21,60000	166,24737	11,83846	180,75698
12,67050	150,85230	3,71377	169,81195	26,65174	152,25392	5,46142	188,96493	15,72890	176,74203	22,71952	158,05545	12,45204	171,85009
13,25714	144,17692	3,88571	162,29758	27,88571	145,51651	5,71429	180,60302	16,45714	168,92099	23,77143	151,06131	13,02857	164,24553
13,80729	138,43226	4,04696	155,83091	29,04291	139,71848	5,95142	173,40698	17,14008	162,19042	24,75789	145,04235	13,56923	157,70125
14,32245	133,45301	4,19796	150,22586	30,12653	134,69297	6,17347	167,16973	17,77959	156,35662	25,68163	139,82535	14,07551	152,02892
14,80434	129,10901	4,33920	145,33588	31,14017	130,30860	6,38118	161,72822	18,37780	151,26708	26,54572	135,27392	14,54910	147,08025
15,25479	125,29660	4,47123	141,04433	32,08767	126,46078	6,57534	156,95262	18,93699	146,80039	27,35342	131,27947	14,99178	142,73719
15,67568	121,93248	4,59459	137,25738	32,97297	123,06539	6,75676	152,73855	19,45946	142,85890	28,10811	127,75471	15,40541	138,90479
16,06885	118,94900	4,70984	133,89893	33,80000	120,05420	6,92623	149,00130	19,94754	139,36339	28,81311	124,62878	15,79180	135,50603
16,43615	116,29085	4,81749	130,90669	34,57259	117,37134	7,08455	145,67157	20,40350	136,24903	29,47172	121,84369	16,15277	132,47788
16,77934	113,91237	4,91808	128,22928	35,29446	114,97077	7,23247	142,69218	20,82952	133,46236	30,08708	119,35165	16,49004	129,76833
17,10009	111,77568	5,01209	125,82405	35,96915	112,81423	7,37073	140,01566	21,22770	130,95896	30,66223	117,11293	16,80526	127,33423
17,40000	109,84908	5,10000	123,65530	36,60000	110,86972	7,50000	137,60230	21,60000	128,70171	31,20000	115,09433	17,10000	125,13945
17,68057	108,10590	5,18224	121,69303	37,19017	109,11034	7,62094	135,41870	21,94830	126,65936	31,70309	113,26791	17,37573	123,15363
17,94320	106,52357	5,25921	119,91183	37,74260	107,51332	7,73414	133,43660	22,27432	124,80547	32,17402	111,61003	17,63384	121,35105
18,18920	105,08290	5,33132	118,29009	38,26004	106,05926	7,84017	131,63195	22,57970	123,11754	32,61512	110,10057	17,87559	119,70985
18,41978	103,76747	5,39890	116,80933	38,74505	104,73161	7,93956	129,98418	22,86593	121,57636	33,02857	108,72233	18,10220	118,21132
18,63607	102,56317	5,46230	115,45367	39,20000	103,51612	8,03279	128,47561	23,13443	120,16537	33,41639	107,46053	18,31475	116,83939
18,83910	101,45783	5,52180	114,20941	39,62707	102,40051	8,12030	127,09101	23,38647	118,87033	33,78045	106,30241	18,51429	115,58019
19,02984	100,44089	5,57771	113,06466	40,02828	101,37412	8,20252	125,81715	23,62325	117,67886	34,12247	105,23691	18,70174	114,42170
19,20917	99,50318	5,63028	112,00909	40,40550	100,42770	8,27982	124,64252	23,84587	116,58022	34,44404	104,25442	18,87798	113,35346
19,37792	98,63667	5,67974	111,03368	40,76046	99,55314	8,35255	123,55709	24,05535	115,56500	34,74662	103,34654	19,04382	112,36634
19,53684	97,83434	5,72632	110,13050	41,09474	98,74335	8,42105	122,55205	24,25263	114,62496	35,03158	102,50589	19,20000	111,45232
19,68662	97,08999	5,77022	109,29260	41,40979	97,99208	8,48561	121,61964	24,43857	113,75286	35,30015	101,72600	19,34720	110,60437
19,82791	96,39817	5,81163	108,51384	41,70698	97,29384	8,54651	120,75304	24,61395	112,94232	35,55349	101,00115	19,48605	109,81625
19,96128	95,75406	5,85072	107,78877	41,98753	96,64374	8,60400	119,94619	24,77953	112,18766	35,79265	100,32628	19,61712	109,08248
20,08730	95,15336	5,88766	107,11257	42,25259	96,03746	8,65832	119,19373	24,93596	111,48387	36,01860	99,69690	19,74097	108,39817
20,20645	94,59226	5,92258	106,48095	42,50323	95,47115	8,70968	118,49087	25,08387	110,82647	36,23226	99,10901	19,85806	107,75897
20,31921	94,06736	5,95563	105,89008	42,74040	94,94137	8,75828	117,83335	25,22384	110,21148	36,43444	98,55904	19,96887	107,16100
20,42599	93,57560	5,98693	105,33652	42,96501	94,44504	8,80430	117,21735	25,35640	109,63533	36,62591	98,04380	20,07381	106,60080
20,52719	93,11426	6,01659	104,81719	43,17788	93,97941	8,84793	116,63945	25,48203	109,09481	36,80737	97,56043	20,17327	106,07524
20,62318	92,68087	6,04472	104,32933	43,37979	93,54200	8,88930	116,09657	25,60118	108,58704	36,97949	97,10635	20,26760	105,58153
20,71429	92,27323	6,07143	103,87045	43,57143	93,13057	8,92857	115,58593	25,71429	108,10944	37,14286	96,67924	20,35714	105,11714
20,80083	91,88932	6,09679	103,43830	43,75346	92,74310	8,96587	115,10504	25,82172	107,65965	37,29804	96,27701	20,44219	104,67980
20,88309	91,52736	6,12091	103,03084	43,92650	92,37777	9,00133	114,65162	25,92383	107,23556	37,44554	95,89776	20,52304	104,26745
20,96134	91,18568	6,14384	102,64623	44,09109	92,03292	9,03506	114,22362	26,02097	106,83525	37,58585	95,53977	20,59994	103,87822
21,03582	90,86282	6,16567	102,28278	44,24776	91,70706	9,06716	113,81918	26,11343	106,45697	37,71940	95,20149	20,67313	103,51041
21,10677	90,55740	6,18647	101,93898	44,39699	91,39880	9,09774	113,43660	26,20150	106,09914	37,84662	94,88149	20,74286	103,16248
21,17439	90,26820	6,20629	101,61343	44,53923	91,10691	9,12689	113,07434	26,28545	105,76030	37,96787	94,57847	20,80931	102,83302
21,23888	89,99409	6,22519	101,30486	44,67489	90,83025	9,15469	112,73097	26,36551	105,43914	38,08352	94,29127	20,87270	102,52076
21,30044	89,73403	6,24323	101,01212	44,80437	90,56778	9,18122	112,40521	26,44192	105,13445	38,19389	94,01880	20,93319	102,22450
21,35922	89,48708	6,26046	100,73413	44,92801	90,31853	9,20656	112,09587	26,51489	104,84512	38,29929	93,76006	20,99095	101,94318
21,41538	89,25238	6,27692	100,46993	45,04615	90,08165	9,23077	111,80187	26,58462	104,57014	38,40000	93,51415	21,04615	101,67580
21,46909	89,02912	6,29266	100,21862	45,15911	89,85632	9,25392	111,52221	26,65128	104,30857	38,49629	93,28023	21,09893	101,42147
21,52046	88,81658	6,30772	99,97936	45,26718	89,64181	9,27606	111,25597	26,71506	104,05955	38,58842	93,05754	21,14942	101,17935
21,56964	88,61408	6,32214	99,75141	45,37063	89,43742	9,29726	111,00231	26,77611	103,82230	38,67660	92,84537	21,19775	100,94866
21,61674	88,42100	6,33594	99,53406	45,46970	89,24255	9,31756	110,76044	26,83458	103,59608	38,76106	92,64307	21,24404	100,72870
21,66188	88,23676	6,34917	99,32667	45,56464	89,05660	9,33702	110,52966	26,89061	103,38022	38,84199	92,45003	21,28840	100,51882
21,70515	88,06083	6,36186	99,12863	45,65567	88,87903	9,35567	110,30928	26,94433	103,17410	38,91959	92,26571	21,33093	100,31840
21,74667	87,89272	6,37402	98,93939	45,74299	88,70936	9,37356	110,09870	26,99587	102,97714	38,99403	92,08957	21,37173	100,12689
21,78652	87,73197	6,38570	98,75844	45,82681	88,54712	9,39074	109,89734	27,04533	102,78880	39,06548	91,92114	21,41089	99,94377
21,82478	87,57816	6,39692	98,58530	45,90729	88,39188	9,40723	109,70467	27,09283	102,60859	39,13408	91,75999	21,44849	99,76855
21,86154	87,43090	6,40769	98,41952	45,98462	88,24325	9,42308	109,52020	27,13846	102,43605	39,20000	91,60569	21,48462	99,60079

EK Tablo 2 Devamı

DOY	n2ref	DOY	n2ref	DOY	n2ref	DOY	n2ref	DOY	n2ref
317,50907	7,10000	323,99906	6,90000	345,50145	4,50000	346,63515	1,80000	360,89402	6,60000
n1	u1	n1	u1	n1	u1	n1	u1	n1	u1
3,40000	404,90174	4,60000	444,58918	3,20000	440,31292	0,80000	362,86187	3,70000	370,25930
n2	u2	n2	u2	n2	u2	n2	u2	n2	u2
4,16102	330,84835	5,62961	363,27727	3,91625	359,78310	0,97906	296,49725	4,52817	302,54174
4,41081	312,11176	5,96757	342,70416	4,15135	339,40788	1,03784	279,70603	4,80000	285,40821
4,90064	280,91556	6,63028	308,45019	4,61237	305,48337	1,15309	251,74884	5,33305	256,88108
5,37419	256,16233	7,27097	281,27071	5,05806	278,56532	1,26452	229,56568	5,84839	234,24568
5,82857	236,19268	7,88571	259,34369	5,48571	256,84920	1,37143	211,66943	6,34286	215,98459
6,26187	219,84899	8,47194	241,39803	5,89353	239,07616	1,47338	197,02266	6,81439	201,03923
6,67301	206,30374	9,02818	226,52511	6,28048	224,34629	1,57012	184,88378	7,26180	188,65288
7,06154	194,95269	9,55385	214,06146	6,64615	212,00252	1,66154	174,71127	7,68462	178,27300
7,42753	185,34630	10,04902	203,51347	6,99062	201,55598	1,74766	166,10228	8,08290	169,48850
7,77143	177,14451	10,51429	194,50777	7,31429	192,63690	1,82857	158,75207	8,45714	161,98844
8,09393	170,08628	10,95061	186,75770	7,61781	184,96138	1,90445	152,42667	8,80810	155,53409
8,39592	163,96847	11,35918	180,04025	7,90204	178,30854	1,97551	146,94406	9,13673	149,93972
8,67841	158,63116	11,74138	174,17979	8,16791	172,50445	2,04198	142,16091	9,44415	145,05906
8,94247	153,94702	12,09863	169,03651	8,41644	167,41064	2,10411	137,96311	9,73151	140,77567
9,18919	149,81364	12,43243	164,49800	8,64865	162,91578	2,16216	134,25889	10,00000	136,99594
9,41967	146,14797	12,74426	160,47302	8,86557	158,92952	2,21639	130,97381	10,25082	133,64389
9,63499	142,88199	13,03557	156,88692	9,06822	155,37791	2,26706	128,04694	10,48513	130,65735
9,83616	139,95966	13,30775	153,67815	9,25756	152,20000	2,31439	125,42802	10,70406	127,98504
10,02419	137,33439	13,56214	150,79556	9,43453	149,34514	2,35863	123,07533	10,90868	125,58438
10,20000	134,96725	13,80000	148,19639	9,60000	146,77097	2,40000	120,95396	11,10000	123,41977
10,36447	132,82547	14,02252	145,84468	9,75480	144,44188	2,43870	119,03455	11,27898	121,46123
10,51843	130,88132	14,23082	143,70998	9,89970	142,32771	2,47492	117,29227	11,44653	119,68343
10,66263	129,11123	14,42592	141,76638	10,03542	140,40281	2,50886	115,70596	11,60346	118,06478
10,79780	127,49501	14,60879	139,99175	10,16264	138,64525	2,54066	114,25755	11,75055	116,58684
10,92459	126,01534	14,78033	138,36704	10,28197	137,03616	2,57049	112,93150	11,88852	115,23376
11,04361	124,65725	14,94135	136,87584	10,39398	135,55930	2,59850	111,71442	12,01805	113,99187
11,15542	123,40778	15,09263	135,50390	10,49922	134,20056	2,62481	110,59468	12,13972	112,84930
11,26055	122,25565	15,23486	134,23884	10,59817	132,94767	2,64954	109,56217	12,25413	111,79574
11,35947	121,19100	15,36870	133,06984	10,69127	131,78991	2,67282	108,60807	12,36178	110,82219
11,45263	120,20520	15,49474	131,98741	10,77895	130,71790	2,69474	107,72462	12,46316	109,92073
11,54043	119,29065	15,61353	130,98322	10,86159	129,72336	2,71540	106,90502	12,55871	109,08443
11,62326	118,44065	15,72558	130,04990	10,93953	128,79902	2,73488	106,14327	12,64884	108,30714
11,70144	117,64925	15,83136	129,18093	11,01312	127,93841	2,75328	105,43404	12,73392	107,58346
11,77531	116,91119	15,93131	128,37053	11,08265	127,13581	2,77066	104,77262	12,81431	106,90855
11,84516	116,22180	16,02581	127,61356	11,14839	126,38612	2,78710	104,15480	12,89032	106,27813
11,91126	115,57687	16,11523	126,90542	11,21060	125,68479	2,80265	103,57683	12,96225	105,68838
11,97385	114,97267	16,19992	126,24199	11,26951	125,02774	2,81738	103,03536	13,03037	105,13587
12,03318	114,40583	16,28018	125,61960	11,32535	124,41133	2,83134	102,52738	13,09493	104,61754
12,08945	113,87334	16,35631	125,03492	11,37830	123,83228	2,84458	102,05018	13,15616	104,13061
12,14286	113,37249	16,42857	124,48497	11,42857	123,28762	2,85714	101,60132	13,21429	103,67260
12,19359	112,90080	16,49721	123,96705	11,47632	122,77468	2,86908	101,17861	13,26949	103,24128
12,24181	112,45607	16,56245	123,47873	11,52170	122,29105	2,88043	100,78005	13,32197	102,83459
12,28768	112,03627	16,62451	123,01778	11,56488	121,83454	2,89122	100,40384	13,37189	102,45071
12,33134	111,63957	16,68358	122,58220	11,60597	121,40315	2,90149	100,04834	13,41940	102,08796
12,37293	111,26432	16,73985	122,17017	11,64511	120,99508	2,91128	99,71204	13,46466	101,74481
12,41257	110,90899	16,79348	121,78001	11,68242	120,60867	2,92061	99,39361	13,50780	101,41988
12,45038	110,57220	16,84463	121,41020	11,71801	120,24243	2,92950	99,09178	13,54894	101,11190
12,48646	110,25267	16,89345	121,05936	11,75197	119,89496	2,93799	98,80543	13,58821	100,81971
12,52092	109,94926	16,94007	120,72621	11,78440	119,56501	2,94610	98,53352	13,62571	100,54226
12,55385	109,66089	16,98462	120,40957	11,81538	119,25142	2,95385	98,27509	13,66154	100,27856
12,58533	109,38658	17,02721	120,10838	11,84501	118,95312	2,96125	98,02927	13,69580	100,02772
12,61544	109,12544	17,06795	119,82164	11,87336	118,66914	2,96834	97,79524	13,72857	99,78893
12,64427	108,87664	17,10696	119,54845	11,90049	118,39858	2,97512	97,57227	13,75994	99,56141
12,67188	108,63941	17,14431	119,28797	11,92648	118,14060	2,98162	97,35967	13,78999	99,34448
12,69834	108,41304	17,18011	119,03941	11,95138	117,89444	2,98785	97,15680	13,81878	99,13748
12,72371	108,19688	17,21443	118,80207	11,97526	117,65938	2,99381	96,96309	13,84639	98,93981
12,74805	107,99033	17,24736	118,57527	11,99816	117,43476	2,99954	96,77799	13,87288	98,75094
12,77141	107,79283	17,27896	118,35841	12,02015	117,21998	3,00504	96,60099	13,89829	98,57033
12,79384	107,60385	17,30931	118,15091	12,04126	117,01448	3,01031	96,43163	13,92270	98,39752
12,81538	107,42291	17,33846	117,95223	12,06154	116,81771	3,01538	96,26948	13,94615	98,23206

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2000								DOY	n2ref	DOY	n2ref
								11,56975	20,50000	22,01565	13,00000
								n1	u1	n1	u1
			Re1=1e13	Re1=1e13	Re1=1e13	Re1=1e13	Re1=1e13	12,40000	423,18566	6,90000	331,74813
step	Mach	Re2/Re1	M2/M1	Kappa	U2/U1	S2-S1	Cs2^2/Cs1^2	n2	u2	n2	u2
1,00000	1,15000	1,77820	0,76312	1,22383	0,81711	0,02571	1,14650	15,17548	345,78828	8,44442	271,07397
2,00000	1,20000	1,70411	0,70520	1,29730	0,77083	0,05550	1,19479	16,08649	326,20561	8,95135	255,72251
3,00000	1,30000	1,57303	0,61033	1,44136	0,69379	0,15718	1,29218	17,87292	293,60070	9,94542	230,16253
4,00000	1,40000	1,46067	0,53626	1,58065	0,63265	0,31681	1,39184	19,60000	267,72970	10,90645	209,88147
5,00000	1,50000	1,36329	0,47712	1,71429	0,58333	0,53199	1,49479	21,25714	246,85830	11,82857	193,51974
6,00000	1,60000	1,27808	0,42902	1,84173	0,54297	0,79777	1,60176	22,83741	229,77659	12,70791	180,12887
7,00000	1,70000	1,20290	0,38927	1,96265	0,50952	1,10824	1,71325	24,33684	215,61968	13,54228	169,03084
8,00000	1,80000	1,13608	0,35596	2,07692	0,48148	1,45739	1,82963	25,75385	203,75606	14,33077	159,73058
9,00000	1,90000	1,07628	0,32771	2,18457	0,45776	1,83948	1,95119	27,08865	193,71587	15,07352	151,85977
10,00000	2,00000	1,02247	0,30349	2,28571	0,43750	2,24924	2,07812	28,34286	185,14372	15,77143	145,13981
11,00000	2,10000	0,97378	0,28253	2,38057	0,42007	2,68195	2,21061	29,51903	177,76676	16,42591	139,35678
12,00000	2,20000	0,92952	0,26424	2,46939	0,40496	3,13341	2,34876	30,62041	171,37270	17,03878	134,34428
13,00000	2,30000	0,88910	0,24815	2,55247	0,39178	3,59997	2,49268	31,65066	165,79438	17,61206	129,97127
14,00000	2,40000	0,85206	0,23389	2,63014	0,38021	4,07845	2,64245	32,61370	160,89871	18,14795	126,13340
15,00000	2,50000	0,81797	0,22119	2,70270	0,37000	4,56609	2,79812	33,51351	156,57869	18,64865	122,74681
16,00000	2,60000	0,78651	0,20980	2,77049	0,36095	5,06053	2,95976	34,35410	152,74749	19,11639	119,74341
17,00000	2,70000	0,75738	0,19954	2,83382	0,35288	5,55974	3,12740	35,13936	149,33403	19,55335	117,06750
18,00000	2,80000	0,73033	0,19025	2,89299	0,34566	6,06199	3,30108	35,87306	146,27974	19,96162	114,67314
19,00000	2,90000	0,70515	0,18180	2,94829	0,33918	6,56580	3,48083	36,55881	143,53592	20,34321	112,52218
20,00000	3,00000	0,68165	0,17408	3,00000	0,33333	7,06992	3,66667	37,20000	141,06189	20,70000	110,58271
21,00000	3,10000	0,65966	0,16700	3,04837	0,32804	7,57329	3,85861	37,79984	138,82339	21,03378	108,82788
22,00000	3,20000	0,63904	0,16049	3,09366	0,32324	8,07502	4,05669	38,36133	136,79146	21,34622	107,23499
23,00000	3,30000	0,61968	0,15448	3,13607	0,31887	8,57435	4,26091	38,88726	134,94143	21,63888	105,78470
24,00000	3,40000	0,60145	0,14891	3,17582	0,31488	9,07066	4,47128	39,38022	133,25223	21,91319	104,46048
25,00000	3,50000	0,58427	0,14374	3,21311	0,31122	9,56342	4,68782	39,84262	131,70574	22,17049	103,24814
26,00000	3,60000	0,56804	0,13893	3,24812	0,30787	10,05221	4,91053	40,27669	130,28632	22,41203	102,13542
27,00000	3,70000	0,55269	0,13444	3,28101	0,30478	10,53666	5,13943	40,68448	128,98043	22,63895	101,11169
28,00000	3,80000	0,53814	0,13024	3,31193	0,30194	11,01648	5,37452	41,06789	127,77628	22,85229	100,16772
29,00000	3,90000	0,52434	0,12630	3,34102	0,29931	11,49146	5,61580	41,42867	126,66356	23,05305	99,29542
30,00000	4,00000	0,51123	0,12260	3,36842	0,29687	11,96141	5,86328	41,76842	125,63324	23,24211	98,48773
31,00000	4,10000	0,49876	0,11912	3,39425	0,29462	12,42618	6,11697	42,08864	124,67739	23,42029	97,73841
32,00000	4,20000	0,48689	0,11584	3,41860	0,29252	12,88568	6,37687	42,39070	123,78900	23,58837	97,04197
33,00000	4,30000	0,47557	0,11273	3,44160	0,29056	13,33983	6,64298	42,67585	122,96187	23,74705	96,39355
34,00000	4,40000	0,46476	0,10980	3,46333	0,28874	13,78858	6,91532	42,94526	122,19049	23,89696	95,78884
35,00000	4,50000	0,45443	0,10702	3,48387	0,28704	14,23192	7,19387	43,20000	121,46996	24,03871	95,22400
36,00000	4,60000	0,44455	0,10438	3,50331	0,28544	14,66983	7,47864	43,44106	120,79591	24,17285	94,69559
37,00000	4,70000	0,43509	0,10187	3,52172	0,28395	15,10233	7,76964	43,66935	120,16442	24,29988	94,20055
38,00000	4,80000	0,42603	0,09948	3,53917	0,28255	15,52944	8,06686	43,88571	119,57199	24,42028	93,73612
39,00000	4,90000	0,41733	0,09721	3,55572	0,28124	15,95120	8,37032	44,09093	119,01546	24,53447	93,29984
40,00000	5,00000	0,40899	0,09504	3,57143	0,28000	16,36765	8,68000	44,28571	118,49198	24,64286	92,88948
41,00000	5,10000	0,40097	0,09297	3,58635	0,27884	16,77884	8,99592	44,47073	117,99900	24,74581	92,50301
42,00000	5,20000	0,39326	0,09099	3,60053	0,27774	17,18483	9,31807	44,64660	117,53418	24,84368	92,13863
43,00000	5,30000	0,38584	0,08909	3,61402	0,27670	17,58569	9,64645	44,81390	117,09543	24,93676	91,79467
44,00000	5,40000	0,37869	0,08727	3,62687	0,27572	17,98149	9,98107	44,97313	116,68082	25,02537	91,46965
45,00000	5,50000	0,37181	0,08553	3,63910	0,27479	18,37230	10,32193	45,12481	116,28862	25,10977	91,16219
46,00000	5,60000	0,36517	0,08386	3,65076	0,27392	18,75819	10,66902	45,26938	115,91724	25,19022	90,87106
47,00000	5,70000	0,35876	0,08225	3,66188	0,27308	19,13925	11,02235	45,40727	115,56524	25,26695	90,59511
48,00000	5,80000	0,35258	0,08071	3,67249	0,27229	19,51555	11,38193	45,53886	115,23129	25,34017	90,33332
49,00000	5,90000	0,34660	0,07923	3,68262	0,27155	19,88717	11,74774	45,66453	114,91417	25,41010	90,08472
50,00000	6,00000	0,34082	0,07780	3,69231	0,27083	20,25419	12,11979	45,78462	114,61278	25,47692	89,84845
51,00000	6,10000	0,33524	0,07642	3,70157	0,27016	20,61669	12,49809	45,89943	114,32609	25,54081	89,62370
52,00000	6,20000	0,32983	0,07509	3,71042	0,26951	20,97476	12,88262	46,00927	114,05316	25,60193	89,40975
53,00000	6,30000	0,32459	0,07381	3,71890	0,26890	21,32847	13,27340	46,11441	113,79312	25,66044	89,20589
54,00000	6,40000	0,31952	0,07257	3,72702	0,26831	21,67791	13,67042	46,21510	113,54517	25,71647	89,01152
55,00000	6,50000	0,31461	0,07137	3,73481	0,26775	22,02315	14,07369	46,31160	113,30859	25,77017	88,82605
56,00000	6,60000	0,30984	0,07022	3,74227	0,26722	22,36427	14,48320	46,40412	113,08267	25,82165	88,64895
57,00000	6,70000	0,30521	0,06910	3,74943	0,26671	22,70136	14,89895	46,49288	112,86679	25,87104	88,47972
58,00000	6,80000	0,30073	0,06801	3,75630	0,26622	23,03447	15,32095	46,57807	112,66037	25,91844	88,31789
59,00000	6,90000	0,29637	0,06697	3,76289	0,26575	23,36370	15,74919	46,65987	112,46285	25,96396	88,16306
60,00000	7,00000	0,29213	0,06595	3,76923	0,26531	23,68912	16,18367	46,73846	112,27375	26,00769	88,01481

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DOY	n2ref	DOY	n2ref	DOY	n2ref	DOY	n2ref	DOY	n2ref	DOY	n2ref
27,58102	85,90000	30,78120	5,20000	36,61749	13,30000	42,09230	8,90000	42,97138	19,70000	45,28970	5,60000
n1	u1	n1	u1	n1	u1	n1	u1	n1	u1	n1	u1
41,50000	332,63615	3,80000	610,90290	6,50000	374,95518	3,30000	415,32764	5,50000	433,74801	3,60000	573,58611
n2	u2	n2	u2	n2	u2	n2	u2	n2	u2	n2	u2
50,78890	271,79958	4,65055	499,17349	7,95489	306,37879	4,03864	339,36744	6,73106	354,41886	4,40578	468,68165
53,83784	256,40703	4,92973	470,90432	8,43243	289,02795	4,28108	320,14839	7,13514	334,34743	4,67027	442,13929
59,81663	230,77863	5,47719	423,83648	9,36887	260,13903	4,75650	288,14891	7,92751	300,92873	5,18891	397,94657
65,59677	210,44328	6,00645	386,48959	10,27419	237,21654	5,21613	262,75830	8,69355	274,41201	5,69032	362,88101
71,14286	194,03776	6,51429	356,36002	11,14286	218,72386	5,65714	242,27446	9,42857	253,01968	6,17143	334,59189
76,43165	180,61104	6,99856	331,70118	11,97122	203,58895	6,07770	225,50993	10,12950	235,51162	6,63022	311,43933
81,44992	169,48330	7,45806	311,26454	12,75722	191,04550	6,47674	211,61590	10,79457	221,00137	7,06553	292,25105
86,19231	160,15815	7,89231	294,13843	13,50000	180,53398	6,85385	199,97257	11,42308	208,84164	7,47692	276,17109
90,65961	152,26627	8,30136	279,64461	14,19970	171,63807	7,20908	190,11882	12,01513	198,55086	7,86445	262,56261
94,85714	145,52832	8,68571	267,27002	14,85714	164,04289	7,54286	181,70584	12,57143	189,76476	8,22857	250,94392
98,79352	139,72981	9,04615	256,62077	15,47368	157,50668	7,85587	174,46586	13,09312	182,20367	8,57004	240,94518
102,47959	134,70390	9,38367	247,39043	16,05102	151,84136	8,14898	168,19053	13,58163	175,65002	8,88980	232,27867
105,92762	130,31917	9,69940	239,33767	16,59107	146,89879	8,42316	162,71579	14,03860	169,93247	9,18890	224,71781
109,15068	126,47104	9,99452	232,27037	17,09589	142,56109	8,67945	157,91103	14,46575	164,91461	9,46849	218,08222
112,16216	123,07538	10,27027	226,03407	17,56757	138,73342	8,91892	153,67123	14,86486	160,48677	9,72973	212,22686
114,97541	120,06394	10,52787	220,50341	18,00820	135,33885	9,14262	149,91116	15,23770	156,55993	9,97377	207,03404
117,60350	117,38086	10,76851	215,57582	18,41983	132,31443	9,35160	146,56109	15,58601	153,06128	10,20175	202,40744
120,05904	114,98010	10,99336	211,16669	18,80443	129,60823	9,54686	143,56351	15,91144	149,93075	10,41476	198,26765
122,35408	112,82338	11,20351	207,20577	19,16389	127,17713	9,72936	140,87064	16,21560	147,11846	10,61385	194,54868
124,50000	110,87872	11,40000	203,63430	19,50000	124,98506	9,90000	138,44255	16,50000	144,58267	10,80000	191,19537
126,50753	109,11920	11,58382	200,40285	19,81443	123,00169	10,05964	136,24562	16,76606	142,28831	10,97415	188,16131
128,38671	107,52204	11,75589	197,46959	20,10876	121,20133	10,20906	134,25142	17,01511	140,20566	11,13716	185,40723
130,14687	106,06786	11,91706	194,79893	20,38445	119,56216	10,34903	132,43574	17,24838	138,30946	11,28985	182,89970
131,79670	104,74010	12,06813	192,36043	20,64286	118,06547	10,48022	130,77791	17,46703	136,57809	11,43297	180,61016
133,34426	103,52452	12,20984	190,12794	20,88525	116,69524	10,60328	129,26013	17,67213	134,99300	11,56721	178,51404
134,79699	102,40882	12,34286	188,07890	21,11278	115,43759	10,71880	127,86707	17,86466	133,53816	11,69323	176,59017
136,16177	101,38235	12,46783	186,19374	21,32654	114,28053	10,82732	126,58543	18,04554	132,19968	11,81162	174,82016
137,44495	100,43585	12,58532	184,45545	21,52752	113,21362	10,92936	125,40364	18,21560	130,96547	11,92294	173,18805
138,65239	99,56122	12,69588	182,84914	21,71664	112,22771	11,02537	124,31158	18,37562	129,82497	12,02768	171,67986
139,78947	98,75136	12,80000	181,36180	21,89474	111,31482	11,11579	123,30039	18,52632	128,76894	12,12632	170,28337
140,86118	98,00003	12,89813	179,98195	22,06259	110,46791	11,20101	122,36229	18,66835	127,78924	12,21928	168,98782
141,87209	97,30173	12,99070	178,69949	22,22093	109,68077	11,28140	121,49040	18,80233	126,87867	12,30698	167,78369
142,82643	96,65158	13,07808	177,50545	22,37040	108,94790	11,35728	120,67862	18,92880	126,03089	12,38976	166,66259
143,72809	96,04525	13,16064	176,39190	22,51163	108,26444	11,42898	119,92157	19,04830	125,24026	12,46798	165,61706
144,58065	95,47890	13,23871	175,35176	22,64516	107,62603	11,49677	119,21442	19,16129	124,50174	12,54194	164,64046
145,38742	94,94907	13,31258	174,37871	22,77152	107,02880	11,56093	118,55288	19,26821	123,81087	12,61192	163,72685
146,15145	94,45271	13,38254	173,46711	22,89119	106,46928	11,62168	117,93312	19,36947	123,16362	12,67820	162,87093
146,87558	93,98704	13,44885	172,61189	23,00461	105,94437	11,67926	117,35169	19,46544	122,55641	12,74101	162,06795
147,56238	93,54959	13,51174	171,80849	23,11218	105,45127	11,73388	116,80549	19,55646	121,98598	12,80059	161,31363
148,21429	93,13812	13,57143	171,05281	23,21429	104,98745	11,78571	116,29174	19,64286	121,44944	12,85714	160,60411
148,83351	92,75062	13,62813	170,34115	23,31127	104,55065	11,83495	115,80791	19,72492	120,94416	12,91086	159,93592
149,42210	92,38526	13,68202	169,67015	23,40346	104,13881	11,88176	115,35172	19,80293	120,46774	12,96192	159,30590
149,98199	92,04039	13,73329	169,03677	23,49115	103,75006	11,92628	114,92111	19,87713	120,01803	13,01049	158,71121
150,51493	91,71449	13,78209	168,43825	23,57463	103,38271	11,96866	114,51421	19,94776	119,59307	13,05672	158,14926
151,02256	91,40622	13,82857	167,87208	23,65414	103,03521	12,00902	114,12929	20,01504	119,19109	13,10075	157,61767
151,50640	91,11430	13,87288	167,33597	23,72992	102,70616	12,04750	113,76481	20,07916	118,81044	13,14272	157,11431
151,96788	90,83762	13,91513	166,82782	23,80220	102,39427	12,08419	113,41934	20,14032	118,44965	13,18276	156,63720
152,40830	90,57512	13,95546	166,34574	23,87118	102,09838	12,11921	113,09159	20,19869	118,10737	13,22096	156,18456
152,82888	90,32586	13,99397	165,88795	23,93705	101,81741	12,15266	112,78037	20,25443	117,78234	13,25745	155,75474
153,23077	90,08896	14,03077	165,45287	24,00000	101,55036	12,18462	112,48457	20,30769	117,47342	13,29231	155,34624
153,61502	89,86361	14,06595	165,03900	24,06018	101,29634	12,21517	112,20320	20,35862	117,17957	13,32564	154,95765
153,98263	89,64908	14,09961	164,64501	24,11776	101,05452	12,24440	111,93534	20,40734	116,89983	13,35753	154,58772
154,33450	89,44468	14,13183	164,26962	24,17287	100,82412	12,27238	111,68013	20,45397	116,63330	13,38805	154,23527
154,67152	89,24979	14,16269	163,91169	24,22566	100,60443	12,29918	111,43679	20,49864	116,37917	13,41729	153,89920
154,99448	89,06382	14,19227	163,57015	24,27624	100,39481	12,32486	111,20459	20,54144	116,13667	13,44530	153,57853
155,30412	88,88624	14,22062	163,24402	24,32474	100,19464	12,34948	110,98287	20,58247	115,90512	13,47216	153,27232
155,60117	88,71656	14,24782	162,93239	24,37127	100,00336	12,37311	110,77100	20,62184	115,68385	13,49793	152,97972
155,88627	88,55430	14,27392	162,63440	24,41592	99,82047	12,39578	110,56841	20,65963	115,47228	13,52266	152,69993
156,16005	88,39905	14,29899	162,34927	24,45880	99,64546	12,41755	110,37456	20,69591	115,26983	13,54641	152,43222
156,42308	88,25041	14,32308	162,07628	24,50000	99,47791	12,43846	110,18897	20,73077	115,07600	13,56923	152,17591

EK Tablo 2 Devamı

DOY	n2ref	DOY	n2ref	DOY	n2ref	DOY	n2ref	DOY	n2ref	DOY	n2ref
155,33622	15,50000	156,59936	4,90000	160,36194	12,40000	163,30361	4,10000	175,51860	17,60000	192,24858	13,60000
n1	u1	n1	u1	n1	u1	n1	u1	n1	u1	n1	u1
11,00000	382,73371	2,60000	407,58286	3,80000	510,20080	3,20000	461,37670	6,90000	400,89941	6,80000	403,36588
n2	u2	n2	u2	n2	u2	n2	u2	n2	u2	n2	u2
13,46212	312,73468	3,18195	333,03912	4,65055	416,88903	3,91625	376,99448	8,44442	327,57802	8,32204	329,59338
14,27027	295,02390	3,37297	314,17846	4,92973	393,27979	4,15135	355,64454	8,95135	309,02663	8,82162	310,92786
15,85501	265,53566	3,74755	282,77568	5,47719	353,97068	4,61237	320,09715	9,94542	278,13879	9,80128	279,84999
17,38710	242,13765	4,10968	257,85855	6,00645	322,78010	5,05806	291,89138	10,90645	253,63024	10,74839	255,19066
18,85714	223,26133	4,45714	237,75667	6,51429	297,61714	5,48571	269,13641	11,82857	233,85799	11,65714	235,29676
20,25899	207,81244	4,78849	221,30476	6,99856	277,02309	5,89353	250,51313	12,70791	217,67585	12,52374	219,01507
21,58913	195,00878	5,10289	207,66982	7,45806	259,95525	6,28048	235,07861	13,54228	204,26449	13,34601	205,52119
22,84615	184,27919	5,40000	196,24360	7,89231	245,65224	6,64615	222,14434	14,33077	193,02564	14,12308	194,21320
24,03026	175,19874	5,67988	186,57360	8,30136	233,54760	6,99062	211,19806	15,07352	183,51421	14,85507	184,64324
25,14286	167,44600	5,94286	178,31750	8,68571	223,21285	7,31429	201,85231	15,77143	175,39349	15,54286	176,47257
26,18623	160,77419	6,18947	171,21253	9,04615	214,31905	7,61781	193,80960	16,42591	168,40503	16,18785	169,44111
27,16327	154,99134	6,42041	165,05422	9,38367	206,61024	7,90204	186,83850	17,03878	162,34770	16,79184	163,34651
28,07720	149,94624	6,63643	159,68157	9,69940	199,88491	8,16791	180,75675	17,61206	157,06314	17,35682	158,02945
28,93151	145,51854	6,83836	154,96640	9,99452	193,98260	8,41644	175,41927	18,14795	152,42530	17,88493	153,36307
29,72973	141,61147	7,02703	150,80566	10,27027	188,77430	8,64865	170,70938	18,64865	148,33278	18,37838	149,24537
30,47541	138,14649	7,20328	147,11571	10,52787	184,15532	8,86557	166,53242	19,11639	144,70334	18,83934	145,59360
31,17201	135,05932	7,36793	143,82811	10,76851	180,04000	9,06822	162,81091	19,55335	141,46965	19,26997	142,34002
31,82288	132,29698	7,52177	140,88642	10,99336	176,35768	9,25756	159,48098	19,96162	138,57620	19,67232	139,42877
32,43120	129,81545	7,66556	138,24377	11,20351	173,04968	9,43453	156,48954	20,34321	135,97688	20,04838	136,81346
33,00000	127,57790	7,80000	135,86095	11,40000	170,06693	9,60000	153,79223	20,70000	133,63314	20,40000	134,45529
33,53212	125,55338	7,92577	133,70499	11,58382	167,36816	9,75480	151,35172	21,03378	131,51253	20,72895	132,32164
34,03021	123,71568	8,04350	131,74798	11,75589	164,91842	9,89970	149,13641	21,34622	129,58760	21,03686	130,38487
34,49676	122,04250	8,15378	129,96616	11,91706	162,68800	10,03542	147,11943	21,63888	127,83501	21,32527	128,62149
34,93407	120,51477	8,25714	128,33924	12,06813	160,65146	10,16264	145,27778	21,91319	126,23476	21,59560	127,01140
35,34426	119,11610	8,35410	126,84977	12,20984	158,78698	10,28197	143,59173	22,17049	124,76972	21,84918	125,53734
35,72932	117,83237	8,44511	125,48269	12,34286	157,07571	10,39398	142,04422	22,41203	123,42505	22,08722	124,18440
36,09107	116,65131	8,53062	124,22494	12,46783	155,50130	10,49922	140,62047	22,63895	122,18793	22,31084	122,93967
36,43119	115,56225	8,61101	123,06519	12,58532	154,04955	10,59817	139,30765	22,85229	121,04719	22,52110	121,79191
36,75124	114,55590	8,68666	121,99349	12,69588	152,70803	10,69127	138,09451	23,05305	119,99307	22,71895	120,73131
37,05263	113,62407	8,75789	121,00116	12,80000	151,46586	10,77895	136,97121	23,24211	119,01701	22,90526	119,74924
37,33670	112,75959	8,82504	120,08055	12,89813	150,31347	10,86159	135,92910	23,42029	118,11150	23,08087	118,83816
37,60465	111,95612	8,88837	119,22492	12,99070	149,24241	10,93953	134,96053	23,58837	117,26990	23,24651	117,99138
37,85761	111,20805	8,94816	118,42828	13,07808	148,24520	11,01312	134,05875	23,74705	116,48632	23,40289	117,20298
38,09660	110,51040	9,00465	117,68534	13,16064	147,31521	11,08265	133,21776	23,89696	115,75556	23,55063	116,46773
38,32258	109,85875	9,05806	116,99138	13,23871	146,44653	11,14839	132,43220	24,03871	115,07298	23,69032	115,78095
38,53642	109,24913	9,10861	116,34218	13,31258	145,63388	11,21060	131,69732	24,17285	114,43443	23,82252	115,13846
38,73894	108,67801	9,15648	115,73397	13,38254	144,87255	11,26951	131,00884	24,29988	113,83620	23,94771	114,53655
38,93088	108,14221	9,20184	115,16339	13,44885	144,15830	11,32535	130,36295	24,42028	113,27496	24,06636	113,97187
39,11292	107,63887	9,24487	114,62738	13,51174	143,48734	11,37830	129,75619	24,53447	112,74774	24,17890	113,44140
39,28571	107,16544	9,28571	114,12320	13,57143	142,85623	11,42857	129,18548	24,64286	112,25184	24,28571	112,94245
39,44984	106,71958	9,32451	113,64839	13,62813	142,26187	11,47632	128,64800	24,74581	111,78481	24,38718	112,47255
39,60586	106,29919	9,36138	113,20071	13,68202	141,70148	11,52170	128,14124	24,84368	111,34447	24,48362	112,02950
39,75426	105,90238	9,39646	112,77813	13,73329	141,17251	11,56488	127,66288	24,93676	110,92882	24,57536	111,61129
39,89552	105,52740	9,42985	112,37881	13,78209	140,67265	11,60597	127,21086	25,02537	110,53605	24,66269	111,21611
40,03008	105,17269	9,46165	112,00108	13,82857	140,19981	11,64511	126,78327	25,10977	110,16451	24,74586	110,84228
40,15832	104,83682	9,49197	111,64339	13,87288	139,75207	11,68242	126,37838	25,19022	109,81269	24,82515	110,48829
40,28064	104,51846	9,52088	111,30437	13,91513	139,32769	11,71801	125,99461	25,26695	109,47923	24,90076	110,15278
40,39738	104,21643	9,54847	110,98273	13,95546	138,92507	11,75197	125,63052	25,34017	109,16286	24,97293	109,83447
40,50886	103,92963	9,57482	110,67731	13,99397	138,54275	11,78440	125,28478	25,41010	108,86244	25,04184	109,53220
40,61538	103,65705	9,60000	110,38703	14,03077	138,17938	11,81538	124,95619	25,47692	108,57692	25,10769	109,24492
40,71723	103,39776	9,62407	110,11090	14,06595	137,83374	11,84501	124,64362	25,54081	108,30533	25,17065	108,97166
40,81467	103,15092	9,64710	109,84803	14,09961	137,50469	11,87336	124,34606	25,60193	108,04677	25,23089	108,71151
40,90794	102,91573	9,66915	109,59758	14,13183	137,19118	11,90049	124,06256	25,66044	107,80043	25,28855	108,46365
40,99727	102,69149	9,69026	109,35878	14,16269	136,89226	11,92648	123,79223	25,71647	107,56554	25,34377	108,22732
41,08287	102,47752	9,71050	109,13091	14,19227	136,60702	11,95138	123,53429	25,77017	107,34141	25,39669	108,00181
41,16495	102,27319	9,72990	108,91333	14,22062	136,33465	11,97526	123,28799	25,82165	107,12739	25,44742	107,78647
41,24368	102,07795	9,74851	108,70541	14,24782	136,07438	11,99816	123,05263	25,87104	106,92288	25,49610	107,58071
41,31925	101,89126	9,76637	108,50660	14,27392	135,82552	12,02015	122,82758	25,91844	106,72733	25,54281	107,38395
41,39182	101,71263	9,78352	108,31637	14,29899	135,58739	12,04126	122,61224	25,96396	106,54022	25,58767	107,19569
41,46154	101,54160	9,80000	108,13423	14,32308	135,35940	12,06154	122,40606	26,00769	106,36107	25,63077	107,01544

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DOY	n2ref	DOY	n2ref	DOY	n2ref	DOY	n2ref	DOY	n2ref	DOY	n2ref
193,47413	38,30000	195,37653	10,00000	195,38819	19,60000	201,61707	9,90000	208,74652	23,30000	210,23800	20,10000
n1	u1	n1	u1	n1	u1	n1	u1	n1	u1	n1	u1
19,80000	413,05944	4,60000	507,78864	9,90000	601,62657	3,10000	474,92470	11,40000	356,54095	4,60000	336,78933
n2	u2	n2	u2	n2	u2	n2	u2	n2	u2	n2	u2
24,23181	337,51407	5,62961	414,91803	12,11591	491,59373	3,79387	388,06465	13,95165	291,33237	5,62961	275,19317
25,68649	318,39998	5,96757	391,42041	12,84324	463,75381	4,02162	366,08779	14,78919	274,83365	5,96757	259,60844
28,53902	286,57526	6,63028	352,29715	14,26951	417,40068	4,46823	329,49657	16,43156	247,36347	6,63028	233,66005
31,29677	261,32332	7,27097	321,25404	15,64839	380,62089	4,90000	300,46256	18,01935	225,56672	7,27097	213,07080
33,94286	240,95134	7,88571	296,21004	16,97143	350,94883	5,31429	277,03941	19,54286	207,98222	7,88571	196,46044
36,46619	224,27837	8,47194	275,71336	18,23309	326,66443	5,70935	257,86927	20,99568	193,59059	8,47194	182,86608
38,86044	210,46022	9,02818	258,72622	19,43022	306,53811	6,08421	241,98153	22,37419	181,66317	9,02818	171,59941
41,12308	198,88047	9,55385	244,49083	20,56154	289,67205	6,43846	228,66745	23,67692	171,66787	9,55385	162,15782
43,25446	189,08053	10,04902	232,44341	21,62723	275,39831	6,77216	217,39974	24,90408	163,20884	10,04902	154,16741
45,25714	180,71350	10,51429	222,15753	22,62857	263,21162	7,08571	207,77956	26,05714	155,98667	10,51429	147,34533
47,13522	173,51306	10,95061	213,30577	23,56761	252,72409	7,37976	199,50068	27,13846	149,77145	10,95061	141,47443
48,89388	167,27200	11,35918	205,63342	24,44694	243,63390	7,65510	192,32488	28,15102	144,38435	11,35918	136,38576
50,53896	161,82716	11,74138	198,93988	25,26948	235,70342	7,91267	186,06454	29,09819	139,68452	11,74138	131,94629
52,07671	157,04864	12,09863	193,06547	26,03836	228,74344	8,15342	180,57033	29,98356	135,55984	12,09863	128,05011
53,51351	152,83199	12,43243	187,88180	26,75676	222,60183	8,37838	175,72214	30,81081	131,92015	12,43243	124,61205
54,85574	149,09246	12,74426	183,28466	27,42787	217,15515	8,58852	171,42252	31,58361	128,69230	12,74426	121,56301
56,10962	145,76069	13,03557	179,18879	28,05481	212,30238	8,78484	167,59174	32,30554	125,81641	13,03557	118,84644
57,28118	142,77947	13,30775	175,52388	28,64059	207,96020	8,96827	164,16402	32,98007	123,24311	13,30775	116,41570
58,37616	140,10131	13,56214	172,23152	29,18808	204,05943	9,13970	161,08474	33,61052	120,93140	13,56214	114,23205
59,40000	137,68648	13,80000	169,26288	29,70000	200,54219	9,30000	158,30823	34,20000	118,84698	13,80000	112,26311
60,35781	135,50155	14,02252	166,57687	30,17891	197,35981	9,44996	155,79606	34,75147	116,96101	14,02252	110,48162
61,25438	133,51824	14,23082	164,13871	30,62719	194,47109	9,59033	153,51570	35,26767	115,24908	14,23082	108,86452
62,09417	131,71248	14,42592	161,91883	31,04708	191,84098	9,72181	151,43949	35,75119	113,69040	14,42592	107,39219
62,88132	130,06370	14,60879	159,89192	31,44066	189,43951	9,84505	149,54376	36,20440	112,26722	14,60879	106,04785
63,61967	128,55421	14,78033	158,03626	31,80984	187,24092	9,96066	147,80820	36,62951	110,96428	14,78033	104,81709
64,31278	127,16876	14,94135	156,33308	32,15639	185,22299	10,06917	146,21524	37,02857	109,76839	14,94135	103,68745
64,96393	125,89412	15,09263	154,76611	32,48197	183,36646	10,17112	144,74969	37,40348	108,66816	15,09263	102,64817
65,57615	124,71878	15,23486	153,32122	32,78807	181,65456	10,26697	143,39832	37,75596	107,65364	15,23486	101,68985
66,15222	123,63268	15,36870	151,98605	33,07611	180,07265	10,35717	142,14955	38,08764	106,71615	15,36870	100,80430
66,69474	122,62702	15,49474	150,74975	33,34737	178,60789	10,44211	140,99327	38,40000	105,84809	15,49474	99,98433
67,20606	121,69404	15,61353	149,60281	33,60303	177,24899	10,52216	139,92056	38,69440	105,04278	15,61353	99,22362
67,68837	120,82691	15,72558	148,53681	33,84419	175,98600	10,59767	138,92355	38,97209	104,29429	15,72558	98,51661
68,14369	120,01957	15,83136	147,54432	34,07185	174,81010	10,66896	137,99529	39,23425	103,59742	15,83136	97,85834
68,57388	119,26665	15,93131	146,61872	34,28694	173,71346	10,73631	137,12960	39,48193	102,94752	15,93131	97,24444
68,98065	118,56336	16,02581	145,75415	34,49032	172,68911	10,80000	136,32098	39,71613	102,34046	16,02581	96,67101
69,36556	117,90544	16,11523	144,94534	34,68278	171,73084	10,86026	135,56452	39,93775	101,77256	16,11523	96,13457
69,73009	117,28906	16,19992	144,18761	34,86505	170,83308	10,91734	134,85583	40,14763	101,24052	16,19992	95,63201
70,07558	116,71080	16,28018	143,47674	35,03779	169,99084	10,97143	134,19096	40,34654	100,74139	16,28018	95,16053
70,40326	116,16759	16,35631	142,80895	35,20163	169,19964	11,02273	133,56639	40,53521	100,27250	16,35631	94,71761
70,71429	115,65664	16,42857	142,18082	35,35714	168,45544	11,07143	132,97892	40,71429	99,83147	16,42857	94,30101
71,00972	115,17545	16,49721	141,58928	35,50486	167,75458	11,11768	132,42566	40,88438	99,41612	16,49721	93,90867
71,29055	114,72176	16,56245	141,03153	35,64527	167,09377	11,16165	131,90401	41,04607	99,02450	16,56245	93,53875
71,55767	114,29350	16,62451	140,50506	35,77884	166,47001	11,20347	131,41161	41,19987	98,65484	16,62451	93,18957
71,81194	113,88882	16,68358	140,00757	35,90597	165,88058	11,24328	130,94632	41,34627	98,30553	16,68358	92,85961
72,05414	113,50600	16,73985	139,53696	36,02707	165,32300	11,28120	130,50617	41,48571	97,97510	16,73985	92,54748
72,28498	113,14351	16,79348	139,09134	36,14249	164,79503	11,31735	130,08939	41,61863	97,66221	16,79348	92,25192
72,50516	112,79993	16,84463	138,66897	36,25258	164,29461	11,35182	129,69435	41,74539	97,36564	16,84463	91,97178
72,71528	112,47397	16,89345	138,26825	36,35764	163,81984	11,38472	129,31957	41,86638	97,08428	16,89345	91,70601
72,91595	112,16445	16,94007	137,88774	36,45797	163,36901	11,41613	128,96368	41,98191	96,81710	16,94007	91,45364
73,10769	111,87026	16,98462	137,52609	36,55385	162,94053	11,44615	128,62544	42,09231	96,56317	16,98462	91,21378
73,29102	111,59043	17,02721	137,18208	36,64551	162,53295	11,47486	128,30370	42,19786	96,32163	17,02721	90,98561
73,46641	111,32403	17,06795	136,85459	36,73320	162,14493	11,50232	127,99740	42,29884	96,09168	17,06795	90,76840
73,63429	111,07022	17,10696	136,54256	36,81715	161,77525	11,52860	127,70556	42,39550	95,87260	17,10696	90,56145
73,79509	110,82820	17,14431	136,24505	36,89754	161,42275	11,55378	127,42731	42,48808	95,66370	17,14431	90,36413
73,94917	110,59728	17,18011	135,96116	36,97459	161,08640	11,57790	127,16179	42,57680	95,46437	17,18011	90,17584
74,09691	110,37676	17,21443	135,69008	37,04845	160,76523	11,60103	126,90825	42,66186	95,27403	17,21443	89,99605
74,23863	110,16605	17,24736	135,43104	37,11932	160,45832	11,62322	126,66598	42,74345	95,09215	17,24736	89,82424
74,37465	109,96457	17,27896	135,18335	37,18733	160,16486	11,64452	126,43432	42,82177	94,91823	17,27896	89,65996
74,50528	109,77178	17,30931	134,94635	37,25264	159,88406	11,66497	126,21266	42,89698	94,75182	17,30931	89,50277
74,63077	109,58720	17,33846	134,71943	37,31538	159,61521	11,68462	126,00043	42,96923	94,59250	17,33846	89,35227

EK Tablo 2 Devamı

DOY	n2ref	DOY	n2ref	DOY	n2ref	DOY	n2ref	DOY	n2ref	DOY	n2ref
210,38170	34,90000	224,75760	4,40000	248,53052	10,50000	250,67589	28,50000	261,70642	14,10000	274,44326	11,40000
n1	u1	n1	u1	n1	u1	n1	u1	n1	u1	n1	u1
19,40000	389,44340	2,10000	407,42483	5,00000	447,20391	9,50000	389,73236	10,20000	592,74974	8,80000	396,88876
n2	u2	n2	u2	n2	u2	n2	u2	n2	u2	n2	u2
23,74228	318,21722	2,57004	332,90998	6,11914	365,41378	11,62637	318,45333	12,48305	484,34041	10,76969	324,30088
25,16757	300,19595	2,72432	314,05664	6,48649	344,71968	12,32432	300,41869	13,23243	456,91126	11,41622	305,93509
27,96247	270,19076	3,02687	282,66604	7,20682	310,26425	13,69296	270,39124	14,70192	411,24206	12,68401	275,35626
30,66452	246,38256	3,31935	257,75856	7,90323	282,92492	15,01613	246,56537	16,12258	375,00494	13,90968	251,09289
33,25714	227,17532	3,60000	237,66448	8,57143	260,86895	16,28571	227,34387	17,48571	345,77068	15,08571	231,51844
35,72950	211,45559	3,86763	221,21895	9,20863	242,81775	17,49640	211,61249	18,78561	321,84459	16,20719	215,49820
38,07538	198,42748	4,12156	207,58929	9,81324	227,85736	18,64516	198,57470	20,01902	302,01522	17,27131	202,22100
40,29231	187,50978	4,36154	196,16751	10,38462	215,32040	19,73077	187,64891	21,18462	285,39803	18,27692	191,09459
42,38064	178,27014	4,58759	186,50125	10,92284	204,71038	20,75340	178,40242	22,28260	271,33489	19,22421	181,67830
44,34286	170,38149	4,80000	178,24836	11,42857	195,65171	21,71429	170,50791	23,31429	259,32801	20,11429	173,63883
46,18300	163,59272	4,99919	171,14614	11,90283	187,85607	22,61538	163,71410	24,28178	248,99522	20,94899	166,72028
47,90612	157,70848	5,18571	164,99022	12,34694	181,09911	23,45918	157,82550	25,18776	240,03915	21,73061	160,72355
49,51797	152,57494	5,36019	159,61965	12,76236	175,20418	24,24849	152,68815	26,03522	232,22568	22,46176	155,49186
51,02466	148,06963	5,52329	154,90631	13,15068	170,03065	24,98630	148,17949	26,82740	225,36839	23,14521	150,90042
52,43243	144,09406	5,67568	150,74719	13,51351	165,46545	25,67568	144,20097	27,56757	219,31741	23,78378	146,84884
53,74754	140,56833	5,81803	147,05867	13,85246	161,41680	26,31967	140,67263	28,25902	213,95109	24,38033	143,25571
54,97609	137,42704	5,95102	143,77234	14,16910	157,80961	26,92128	137,52901	28,90496	209,16992	24,93761	140,05437
56,12399	134,61628	6,07528	140,83180	14,46494	154,58196	27,48339	134,71616	29,50849	204,89181	25,45830	137,18987
57,19684	132,09124	6,19141	138,19017	14,74145	151,68242	28,00876	132,18924	30,07257	201,04859	25,94496	134,61655
58,20000	129,81447	6,30000	135,80828	15,00000	149,06797	28,50000	129,91079	30,60000	197,58325	26,40000	132,29625
59,13846	127,75445	6,40159	133,65315	15,24187	146,70243	28,95956	127,84925	31,09342	194,44782	26,82569	130,19686
60,01692	125,88454	6,49668	131,69689	15,46828	144,55517	29,38973	125,97794	31,55529	191,60172	27,22417	128,29119
60,83974	124,18202	6,58575	129,91577	15,68035	142,60015	29,79266	124,27416	31,98790	189,01042	27,59741	126,55613
61,61099	122,62751	6,66923	128,28948	15,87912	140,81507	30,17033	122,71849	32,39341	186,64438	27,94725	124,97189
62,33443	121,20432	6,74754	126,80058	16,06557	139,18081	30,52459	121,29425	32,77377	184,47824	28,27541	123,52150
63,01353	119,89808	6,82105	125,43403	16,24060	137,68083	30,85714	119,98705	33,13083	182,49008	28,58346	122,19029
63,65153	118,69632	6,89011	124,17678	16,40503	136,30083	31,16956	118,78439	33,46627	180,66094	28,87286	120,96555
64,25138	117,58817	6,95505	123,01747	16,55963	135,02833	31,46330	117,67542	33,78165	178,97430	29,14495	119,83622
64,81582	116,56417	7,01614	121,94619	16,70511	133,85245	31,73970	116,65066	34,07842	177,41573	29,40099	118,79264
65,34737	115,61601	7,07368	120,95425	16,84211	132,76366	32,00000	115,70179	34,35789	175,97258	29,64211	117,82635
65,84836	114,73637	7,12792	120,03400	16,97123	131,75356	32,24533	114,82150	34,62130	174,63374	29,86936	116,92990
66,32093	113,91882	7,17907	119,17869	17,09302	130,81475	32,47674	114,00334	34,86977	173,38938	30,08372	116,09671
66,76705	113,15763	7,22736	118,38236	17,20800	129,94067	32,69521	113,24159	35,10433	172,23083	30,28609	115,32098
67,18855	112,44776	7,27299	117,63971	17,31664	129,12551	32,90161	112,53119	35,32594	171,15037	30,47728	114,59753
67,58710	111,78468	7,31613	116,94602	17,41935	128,36409	33,09677	111,86762	35,53548	170,14113	30,65806	113,92177
67,96424	111,16437	7,35695	116,29707	17,51656	127,65178	33,28146	111,24685	35,73377	169,19700	30,82914	113,28961
68,32140	110,58324	7,39562	115,68910	17,60861	126,98445	33,45636	110,66529	35,92156	168,31248	30,99115	112,69736
68,65991	110,03804	7,43226	115,11873	17,69585	126,35840	33,62212	110,11969	36,09954	167,48268	31,14470	112,14175
68,98097	109,52589	7,46701	114,58293	17,77860	125,77028	33,77934	109,60715	36,26835	166,70315	31,29034	111,61980
69,28571	109,04415	7,50000	114,07895	17,85714	125,21710	33,92857	109,12506	36,42857	165,96993	31,42857	111,12885
69,57518	108,59047	7,53133	113,60433	17,93175	124,69613	34,07032	108,67105	36,58077	165,27941	31,55988	110,66650
69,85033	108,16272	7,56112	113,15682	18,00266	124,20493	34,20506	108,24297	36,72543	164,62835	31,68469	110,23057
70,11206	107,75895	7,58945	112,73441	18,07012	123,74128	34,33323	107,83890	36,86304	164,01379	31,80341	109,81908
70,36119	107,37740	7,61642	112,33524	18,13433	123,30314	34,45522	107,45707	36,99403	163,43306	31,91642	109,43023
70,59850	107,01647	7,64211	111,95765	18,19549	122,88868	34,57143	107,09587	37,11880	162,88371	32,02406	109,06241
70,82468	106,67471	7,66659	111,60010	18,25378	122,49622	34,68219	106,75386	37,23772	162,36353	32,12666	108,71411
71,04041	106,35077	7,68994	111,26121	18,30938	122,12425	34,78783	106,42968	37,35114	161,87049	32,22451	108,38398
71,24629	106,04345	7,71223	110,93970	18,36245	121,77134	34,88865	106,12213	37,45939	161,40272	32,31790	108,07078
71,44290	105,75161	7,73351	110,63439	18,41312	121,43622	34,98492	105,83008	37,56276	160,95855	32,40709	107,77337
71,63077	105,47425	7,75385	110,34422	18,46154	121,11773	35,07692	105,55251	37,66154	160,53639	32,49231	107,49071
71,81040	105,21042	7,77329	110,06821	18,50783	120,81476	35,16488	105,28848	37,75598	160,13482	32,57379	107,22183
71,98224	104,95925	7,79189	109,80544	18,55212	120,52634	35,24903	105,03713	37,84633	159,75253	32,65174	106,96586
72,14673	104,71995	7,80970	109,55509	18,59452	120,25154	35,32959	104,79765	37,93282	159,38830	32,72635	106,72198
72,30428	104,49177	7,82675	109,31638	18,63512	119,98953	35,40673	104,56930	38,01565	159,04101	32,79782	106,48944
72,45525	104,27405	7,84309	109,08860	18,67403	119,73951	35,48066	104,35142	38,09503	158,70962	32,86630	106,26755
72,60000	104,06614	7,85876	108,87110	18,71134	119,50077	35,55155	104,14336	38,17113	158,39318	32,93196	106,05567
72,73886	103,86748	7,87379	108,66326	18,74713	119,27264	35,61954	103,94455	38,24414	158,09081	32,99495	105,85321
72,87214	103,67751	7,88822	108,46452	18,78148	119,05450	35,68481	103,75444	38,31422	157,80167	33,05540	105,65962
73,00012	103,49575	7,90207	108,27437	18,81446	118,84578	35,74748	103,57254	38,38151	157,52502	33,11346	105,47438
73,12308	103,32172	7,91538	108,09230	18,84615	118,64594	35,80769	103,39838	38,44615	157,26014	33,16923	105,29702

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DOY	n2ref	DOY	n2ref	DOY	n2ref	DOY	n2ref	DOY	n2ref	DOY	n2ref
277,00585	15,60000	279,11122	16,80000	302,38064	26,60000	305,68765	20,70000	309,06600	48,40000	311,38524	5,10000
n1	u1	n1	u1	n1	u1	n1	u1	n1	u1	n1	u1
6,50000	387,08016	7,00000	360,26980	8,90000	372,67764	7,10000	350,86000	13,20000	358,88339	2,10000	473,46752
n2	u2	n2	u2	n2	u2	n2	u2	n2	u2	n2	u2
7,95489	316,28620	8,56680	294,37925	10,89208	304,51778	8,68918	286,69043	16,15454	293,24640	2,57004	386,87398
8,43243	298,37429	9,08108	277,70797	11,54595	287,27234	9,21081	270,45458	17,12432	276,63928	2,72432	364,96454
9,36887	268,55118	10,08955	249,95050	12,82814	258,55889	10,23369	243,42210	19,02601	248,98863	3,02687	328,48560
10,27419	244,88745	11,06452	227,92579	14,06774	235,77565	11,22258	221,97265	20,86452	227,04868	3,31935	299,54067
11,14286	225,79676	12,00000	210,15738	15,25714	217,39529	12,17143	204,66833	22,62857	209,34865	3,60000	276,18939
11,97122	210,17243	12,89209	195,61524	16,39137	202,35231	13,07626	190,50602	24,31079	194,86247	3,86763	257,07807
12,75722	197,22337	13,73854	183,56307	17,46757	189,88506	13,93480	178,76863	25,90696	182,85668	4,12156	241,23907
13,50000	186,37193	14,53846	173,46324	18,48462	179,43738	14,74615	168,93259	27,41538	172,79571	4,36154	227,96584
14,19970	177,18836	15,29198	164,91575	19,44266	170,59551	15,51044	160,60835	28,83631	164,28111	4,58759	216,73271
14,85714	169,34757	16,00000	157,61804	20,34286	163,04647	16,22857	153,50125	30,17143	157,01148	4,80000	207,14204
15,47368	162,60000	16,66397	151,33782	21,18704	156,54996	16,90202	147,38507	31,42348	150,75544	4,99919	198,88857
16,05102	156,75147	17,28571	145,89438	21,97755	150,91904	17,53265	142,08380	32,59592	145,33294	5,18571	191,73478
16,59107	151,64908	17,86731	141,14540	22,71701	146,00650	18,12256	137,45886	33,69264	140,60224	5,36019	185,49365
17,09589	147,17110	18,41096	136,97758	23,40822	141,69514	18,67397	133,39990	34,71781	136,45046	5,52329	180,01630
17,56757	143,21966	18,91892	133,29983	24,05405	137,89073	19,18919	129,81820	35,67568	132,78686	5,67568	175,18298
18,00820	139,71532	19,39344	130,03821	24,65738	134,51678	19,67049	126,64178	36,57049	129,53779	5,81803	170,89656
18,41983	136,59310	19,83673	127,13224	25,22099	131,51073	20,12012	123,81171	37,40641	126,64301	5,95102	167,07753
18,80443	133,79939	20,25092	124,53204	25,74760	128,82097	20,54022	121,27941	38,18745	124,05281	6,07528	163,66033
19,16389	131,28967	20,63804	122,19615	26,23979	126,40463	20,93287	119,00454	38,91744	121,72591	6,19141	160,59050
19,50000	129,02672	21,00000	120,08993	26,70000	124,22588	21,30000	116,95333	39,60000	119,62780	6,30000	157,82251
19,81443	126,97921	21,33862	118,18424	27,13053	122,25455	21,64346	115,09741	40,23854	117,72944	6,40159	155,31804
20,10876	125,12064	21,65559	116,45440	27,53353	120,46513	21,96495	113,41275	40,83625	116,00625	6,49668	153,04468
20,38445	123,42845	21,95248	114,87942	27,91102	118,83591	22,26609	111,87891	41,39611	114,43734	6,58575	150,97484
20,64286	121,88337	22,23077	113,44136	28,26484	117,34832	22,54835	110,47841	41,92088	113,00481	6,66923	149,08493
20,88525	120,46883	22,49180	112,12479	28,59672	115,98641	22,81311	109,19622	42,41311	111,69330	6,74754	147,35469
21,11278	119,17051	22,73684	110,91640	28,90827	114,73640	23,06165	108,01940	42,87519	110,48956	6,82105	145,76662
21,32654	117,97604	22,96705	109,80466	29,20096	113,58637	23,29515	106,93669	43,30929	109,38210	6,89011	144,30557
21,52752	116,87462	23,18349	108,77952	29,47615	112,52593	23,51468	105,93834	43,71743	108,36091	6,95505	142,95834
21,71664	115,85683	23,38715	107,83223	29,73509	111,54602	23,72125	105,01579	44,10148	107,41727	7,01614	141,71340
21,89474	114,91442	23,57895	106,95510	29,97895	110,63867	23,91579	104,16156	44,46316	106,54351	7,07368	140,56067
22,06259	114,04012	23,75972	106,14136	30,20878	109,79691	24,09914	103,36908	44,80404	105,73290	7,12792	139,49125
22,22093	113,22753	23,93023	105,38504	30,42558	109,01455	24,27209	102,63252	45,12558	104,97950	7,17907	138,49730
22,37040	112,47097	24,09121	104,68088	30,63025	108,28613	24,43537	101,94675	45,42913	104,27804	7,22736	137,57189
22,51163	111,76540	24,24329	104,02418	30,82361	107,60682	24,58962	101,30720	45,71592	103,62387	7,27299	136,70885
22,64516	111,10634	24,38710	103,41078	31,00645	106,97228	24,73548	100,70981	45,98710	103,01283	7,31613	135,90271
22,77152	110,48980	24,52318	102,83694	31,17947	106,37868	24,87351	100,15096	46,24371	102,44120	7,35695	135,14857
22,89119	109,91219	24,65205	102,29934	31,34332	105,82257	25,00422	99,62740	46,48673	101,90566	7,39562	134,44206
23,00461	109,37031	24,77419	101,79498	31,49862	105,30084	25,12811	99,13622	46,71705	101,40325	7,43226	133,77923
23,11218	108,86126	24,89004	101,32119	31,64591	104,81073	25,24561	98,67481	46,93551	100,93128	7,46701	133,15658
23,21429	108,38244	25,00000	100,87554	31,78571	104,34974	25,35714	98,24080	47,14286	100,48735	7,50000	132,57090
23,31127	107,93152	25,10445	100,45585	31,91851	103,91559	25,46308	97,83207	47,33981	100,06927	7,53133	132,01935
23,40346	107,50636	25,20373	100,06014	32,04474	103,50625	25,56378	97,44669	47,52703	99,67508	7,56112	131,49930
23,49115	107,10504	25,29817	99,68662	32,16481	103,11986	25,65957	97,08292	47,70511	99,30300	7,58945	131,00841
23,57463	106,72581	25,38806	99,33365	32,27910	102,75474	25,75075	96,73918	47,87463	98,95139	7,61642	130,54454
23,65414	106,36707	25,47368	98,99976	32,38797	102,40935	25,83759	96,41401	48,03609	98,61878	7,64211	130,10574
23,72992	106,02738	25,55530	98,68360	32,49173	102,08230	25,92037	96,10610	48,18999	98,30384	7,66659	129,69024
23,80220	105,70541	25,63314	98,38393	32,59070	101,77231	25,99932	95,81426	48,33677	98,00532	7,68994	129,29642
23,87118	105,39995	25,70742	98,09962	32,68515	101,47821	26,07467	95,53738	48,47686	97,72211	7,71223	128,92278
23,93705	105,10989	25,77837	97,82966	32,77535	101,19895	26,14663	95,27447	48,61063	97,45318	7,73351	128,56799
24,00000	104,83421	25,84615	97,57307	32,86154	100,93353	26,21538	95,02458	48,73846	97,19759	7,75385	128,23079
24,06018	104,57198	25,91097	97,32900	32,94394	100,68105	26,28112	94,78689	48,86068	96,95446	7,77329	127,91003
24,11776	104,32233	25,97297	97,09665	33,02278	100,44069	26,34402	94,56060	48,97761	96,72300	7,79189	127,60467
24,17287	104,08448	26,03233	96,87527	33,09824	100,21169	26,40422	94,34501	49,08953	96,50247	7,80970	127,31373
24,22566	103,85769	26,08917	96,66419	33,17052	99,99334	26,46187	94,13944	49,19672	96,29220	7,82675	127,03633
24,27624	103,64129	26,14365	96,46277	33,23978	99,78499	26,51713	93,94328	49,29945	96,09156	7,84309	126,77163
24,32474	103,43464	26,19588	96,27044	33,30619	99,58603	26,57010	93,75598	49,39794	95,89997	7,85876	126,51887
24,37127	103,23718	26,24598	96,08666	33,36989	99,39592	26,62092	93,57700	49,49242	95,71690	7,87379	126,27734
24,41592	103,04837	26,29407	95,91093	33,43103	99,21414	26,66970	93,40585	49,58310	95,54184	7,88822	126,04639
24,45880	102,86771	26,34025	95,74278	33,48975	99,04020	26,71654	93,24210	49,67018	95,37434	7,90207	125,82541
24,50000	102,69474	26,38462	95,58178	33,54615	98,87366	26,76154	93,08531	49,75385	95,21396	7,91538	125,61383

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DOY	n2ref	DOY	n2ref	DOY	n2ref	DOY	n2ref	DOY	n2ref
331,20836	10,50000	331,47502	21,90000	333,20651	12,80000	334,12984	11,70000	338,13946	5,50000
n1	u1	n1	u1	n1	u1	n1	u1	n1	u1
5,90000	376,52450	8,80000	465,22926	7,40000	525,35225	6,20000	537,10321	3,60000	380,98983
n2	u2	n2	u2	n2	u2	n2	u2	n2	u2
7,22059	307,66109	10,76969	380,14243	9,05633	429,26940	7,58774	438,87120	4,40578	311,30974
7,65405	290,23764	11,41622	358,61422	9,60000	404,95903	8,04324	414,01706	4,67027	293,67966
8,50405	261,22780	12,68401	322,77000	10,66610	364,48255	8,93646	372,63522	5,18891	264,32578
9,32581	238,20938	13,90968	294,32871	11,69677	332,36571	9,80000	339,79999	5,69032	241,03438
10,11429	219,63929	15,08571	271,38373	12,68571	306,45548	10,62857	313,31021	6,17143	222,24407
10,86619	204,44104	16,20719	252,60495	13,62878	285,24986	11,41871	291,63026	6,63022	206,86557
11,57963	191,84510	17,27131	237,04155	14,52360	267,67515	12,16842	273,66245	7,06553	194,12025
12,25385	181,28957	18,27692	223,99927	15,36923	252,94738	12,87692	258,60525	7,47692	183,43955
12,88896	172,35644	19,22421	212,96159	16,16581	240,48327	13,54433	245,86234	7,86445	174,40047
13,48571	164,72947	20,11429	203,53780	16,91429	229,84161	14,17143	234,98266	8,22857	166,68305
14,04534	158,16590	20,94899	195,42794	17,61619	220,68368	14,75951	225,61989	8,57004	160,04165
14,56939	152,47686	21,73061	188,39862	18,27347	212,74595	15,31020	217,50461	8,88980	154,28514
15,05959	147,51362	22,46176	182,26609	18,88830	205,82090	15,82533	210,42465	9,18890	149,26303
15,51781	143,15775	23,14521	176,88404	19,46301	199,74330	16,30685	204,21112	9,46849	144,85551
15,94595	139,31407	23,78378	172,13482	20,00000	194,38033	16,75676	198,72819	9,72973	140,96624
16,34590	135,90529	24,38033	167,92299	20,50164	189,62419	17,17705	193,86566	9,97377	137,51704
16,71953	132,86821	24,93761	164,17041	20,97026	185,38665	17,56968	189,53333	10,20175	134,44394
17,06863	130,15069	25,45830	160,81266	21,40812	181,59498	17,93653	185,65685	10,41476	131,69419
17,39492	127,70941	25,94496	157,79625	21,81735	178,18874	18,27940	182,17442	10,61385	129,22396
17,70000	125,50817	26,40000	155,07642	22,20000	175,11742	18,60000	179,03440	10,80000	126,99661
17,98541	123,51649	26,82569	152,61553	22,55797	172,33850	18,89992	176,19333	10,97415	124,98131
18,25257	121,70860	27,22417	150,38172	22,89305	169,81601	19,18066	173,61442	11,13716	123,15199
18,50281	120,06256	27,59741	148,34790	23,20691	167,51935	19,44363	171,26638	11,28985	121,48643
18,73736	118,55962	27,94725	146,49087	23,50110	165,42234	19,69011	169,12246	11,43297	119,96566
18,95738	117,18365	28,27541	144,79074	23,77705	163,50249	19,92131	167,15967	11,56721	118,57337
19,16391	115,92074	28,58346	143,23030	24,03609	161,74039	20,13835	165,35816	11,69323	117,29548
19,35794	114,75884	28,87286	141,79467	24,27945	160,11923	20,34224	163,70074	11,81162	116,11980
19,54037	113,68745	29,14495	140,47088	24,50826	158,62436	20,53394	162,17244	11,92294	115,03571
19,71203	112,69742	29,40099	139,24761	24,72356	157,24301	20,71433	160,76018	12,02768	114,03394
19,87368	111,78071	29,64211	138,11494	24,92632	155,96395	20,88421	159,45252	12,12632	113,10636
20,02605	110,93026	29,86936	137,06412	25,11742	154,77734	21,04432	158,23936	12,21928	112,24581
20,16977	110,13982	30,08372	136,08747	25,29767	153,67447	21,19535	157,11182	12,30698	111,44600
20,30544	109,40389	30,28609	135,17816	25,46785	152,64765	21,33792	156,06203	12,38976	110,70134
20,43363	108,71756	30,47728	134,33014	25,62862	151,69004	21,47263	155,08300	12,46798	110,00688
20,55484	108,07648	30,65806	133,53803	25,78065	150,79555	21,60000	154,16851	12,54194	109,35819
20,66954	107,47675	30,82914	132,79701	25,92450	149,95877	21,72053	153,31302	12,61192	108,75135
20,77816	106,91489	30,99115	132,10278	26,06074	149,17483	21,83468	152,51154	12,67820	108,18283
20,88111	106,38778	31,14470	131,45150	26,18986	148,43937	21,94286	151,75963	12,74101	107,64947
20,97875	105,89262	31,29034	130,83967	26,31233	147,74848	22,04546	151,05329	12,80059	107,14843
21,07143	105,42686	31,42857	130,26419	26,42857	147,09863	22,14286	150,38890	12,85714	106,67715
21,15946	104,98823	31,55988	129,72223	26,53899	146,48663	22,23537	149,76321	12,91086	106,23332
21,24314	104,57467	31,68469	129,21123	26,64394	145,90959	22,32330	149,17327	12,96192	105,81485
21,32274	104,18429	31,80341	128,72889	26,74378	145,36491	22,40695	148,61640	13,01049	105,41985
21,39851	103,81540	31,91642	128,27309	26,83881	144,85021	22,48657	148,09019	13,05672	105,04658
21,47068	103,46644	32,02406	127,84192	26,92932	144,36333	22,56241	147,59241	13,10075	104,69349
21,53946	103,13602	32,12666	127,43365	27,01560	143,90229	22,63469	147,12106	13,14272	104,35914
21,60507	102,82283	32,22451	127,04668	27,09789	143,46531	22,70363	146,67431	13,18276	104,04224
21,66769	102,52570	32,31790	126,67955	27,17642	143,05073	22,76943	146,25046	13,22096	103,74158
21,72748	102,24355	32,40709	126,33093	27,25141	142,65706	22,83227	145,84798	13,25745	103,45609
21,78462	101,97539	32,49231	125,99959	27,32308	142,28290	22,89231	145,46545	13,29231	103,18475
21,83924	101,72030	32,57379	125,68442	27,39159	141,92700	22,94971	145,10159	13,32564	102,92664
21,89151	101,47747	32,65174	125,38437	27,45714	141,58817	23,00463	144,75518	13,35753	102,68092
21,94153	101,24610	32,72635	125,09849	27,51989	141,26535	23,05720	144,42515	13,38805	102,44681
21,98944	101,02549	32,79782	124,82592	27,57998	140,95755	23,10755	144,11046	13,41729	102,22359
22,03536	100,81499	32,86630	124,56582	27,63757	140,66384	23,15580	143,81018	13,44530	102,01059
22,07938	100,61399	32,93196	124,31746	27,69278	140,38338	23,20206	143,52345	13,47216	101,80720
22,12161	100,42191	32,99495	124,08013	27,74575	140,11539	23,24644	143,24946	13,49793	101,61285
22,16214	100,23825	33,05540	123,85320	27,79659	139,85913	23,28903	142,98747	13,52266	101,42701
22,20107	100,06251	33,11346	123,63607	27,84541	139,61393	23,32993	142,73679	13,54641	101,24919
22,23846	99,89426	33,16923	123,42817	27,89231	139,37917	23,36923	142,49677	13,56923	101,07893

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2001								DOY	n2ref	DOY	n2ref
								10,63867	15,30000	13,07108	5,20000
								n1	u1	n1	u1
			Re1=1e13	Re1=1e13	Re1=1e13	Re1=1e13	Re1=1e13	5,20000	347,94357	1,00000	347,94357
step	Mach	Re2/Re1	M2/M1	Kappa	U2/U1	S2-S1	Cs2^2/Cs1^2	n2	u2	n2	u2
1,00000	1,15000	1,77820	0,76312	1,22383	0,81711	0,02571	1,14650	6,36391	284,30739	1,22383	284,30739
2,00000	1,20000	1,70411	0,70520	1,29730	0,77083	0,05550	1,19479	6,74595	268,20650	1,29730	268,20650
3,00000	1,30000	1,57303	0,61033	1,44136	0,69379	0,15718	1,29218	7,49510	241,39872	1,44136	241,39872
4,00000	1,40000	1,46067	0,53626	1,58065	0,63265	0,31681	1,39184	8,21935	220,12757	1,58065	220,12757
5,00000	1,50000	1,36329	0,47712	1,71429	0,58333	0,53199	1,49479	8,91429	202,96708	1,71429	202,96708
6,00000	1,60000	1,27808	0,42902	1,84173	0,54297	0,79777	1,60176	9,57698	188,92249	1,84173	188,92249
7,00000	1,70000	1,20290	0,38927	1,96265	0,50952	1,10824	1,71325	10,20577	177,28267	1,96265	177,28267
8,00000	1,80000	1,13608	0,35596	2,07692	0,48148	1,45739	1,82963	10,80000	167,52839	2,07692	167,52839
9,00000	1,90000	1,07628	0,32771	2,18457	0,45776	1,83948	1,95119	11,35976	159,27334	2,18457	159,27334
10,00000	2,00000	1,02247	0,30349	2,28571	0,43750	2,24924	2,07812	11,88571	152,22531	2,28571	152,22531
11,00000	2,10000	0,97378	0,28253	2,38057	0,42007	2,68195	2,21061	12,37895	146,15997	2,38057	146,15997
12,00000	2,20000	0,92952	0,26424	2,46939	0,40496	3,13341	2,34876	12,84082	140,90277	2,46939	140,90277
13,00000	2,30000	0,88910	0,24815	2,55247	0,39178	3,59997	2,49268	13,27286	136,31627	2,55247	136,31627
14,00000	2,40000	0,85206	0,23389	2,63014	0,38021	4,07845	2,64245	13,67671	132,29105	2,63014	132,29105
15,00000	2,50000	0,81797	0,22119	2,70270	0,37000	4,56609	2,79812	14,05405	128,73912	2,70270	128,73912
16,00000	2,60000	0,78651	0,20980	2,77049	0,36095	5,06053	2,95976	14,40656	125,58910	2,77049	125,58910
17,00000	2,70000	0,75738	0,19954	2,83382	0,35288	5,55974	3,12740	14,73586	122,78256	2,83382	122,78256
18,00000	2,80000	0,73033	0,19025	2,89299	0,34566	6,06199	3,30108	15,04354	120,27131	2,89299	120,27131
19,00000	2,90000	0,70515	0,18180	2,94829	0,33918	6,56580	3,48083	15,33111	118,01534	2,94829	118,01534
20,00000	3,00000	0,68165	0,17408	3,00000	0,33333	7,06992	3,66667	15,60000	115,98119	3,00000	115,98119
21,00000	3,10000	0,65966	0,16700	3,04837	0,32804	7,57329	3,85861	15,85155	114,14070	3,04837	114,14070
22,00000	3,20000	0,63904	0,16049	3,09366	0,32324	8,07502	4,05669	16,08701	112,47004	3,09366	112,47004
23,00000	3,30000	0,61968	0,15448	3,13607	0,31887	8,57435	4,26091	16,30756	110,94895	3,13607	110,94895
24,00000	3,40000	0,60145	0,14891	3,17582	0,31488	9,07066	4,47128	16,51429	109,56009	3,17582	109,56009
25,00000	3,50000	0,58427	0,14374	3,21311	0,31122	9,56342	4,68782	16,70820	108,28856	3,21311	108,28856
26,00000	3,60000	0,56804	0,13893	3,24812	0,30787	10,05221	4,91053	16,89023	107,12152	3,24812	107,12152
27,00000	3,70000	0,55269	0,13444	3,28101	0,30478	10,53666	5,13943	17,06123	106,04781	3,28101	106,04781
28,00000	3,80000	0,53814	0,13024	3,31193	0,30194	11,01648	5,37452	17,22202	105,05775	3,31193	105,05775
29,00000	3,90000	0,52434	0,12630	3,34102	0,29931	11,49146	5,61580	17,37331	104,14287	3,34102	104,14287
30,00000	4,00000	0,51123	0,12260	3,36842	0,29687	11,96141	5,86328	17,51579	103,29575	3,36842	103,29575
31,00000	4,10000	0,49876	0,11912	3,39425	0,29462	12,42618	6,11697	17,65008	102,50985	3,39425	102,50985
32,00000	4,20000	0,48689	0,11584	3,41860	0,29252	12,88568	6,37687	17,77674	101,77941	3,41860	101,77941
33,00000	4,30000	0,47557	0,11273	3,44160	0,29056	13,33983	6,64298	17,89632	101,09934	3,44160	101,09934
34,00000	4,40000	0,46476	0,10980	3,46333	0,28874	13,78858	6,91532	18,00930	100,46511	3,46333	100,46511
35,00000	4,50000	0,45443	0,10702	3,48387	0,28704	14,23192	7,19387	18,11613	99,87269	3,48387	99,87269
36,00000	4,60000	0,44455	0,10438	3,50331	0,28544	14,66983	7,47864	18,21722	99,31849	3,50331	99,31849
37,00000	4,70000	0,43509	0,10187	3,52172	0,28395	15,10233	7,76964	18,31295	98,79928	3,52172	98,79928
38,00000	4,80000	0,42603	0,09948	3,53917	0,28255	15,52944	8,06686	18,40369	98,31218	3,53917	98,31218
39,00000	4,90000	0,41733	0,09721	3,55572	0,28124	15,95120	8,37032	18,48974	97,85460	3,55572	97,85460
40,00000	5,00000	0,40899	0,09504	3,57143	0,28000	16,36765	8,68000	18,57143	97,42420	3,57143	97,42420
41,00000	5,10000	0,40097	0,09297	3,58635	0,27884	16,77884	8,99592	18,64902	97,01887	3,58635	97,01887
42,00000	5,20000	0,39326	0,09099	3,60053	0,27774	17,18483	9,31807	18,72277	96,63670	3,60053	96,63670
43,00000	5,30000	0,38584	0,08909	3,61402	0,27670	17,58569	9,64645	18,79292	96,27595	3,61402	96,27595
44,00000	5,40000	0,37869	0,08727	3,62687	0,27572	17,98149	9,98107	18,85970	95,93506	3,62687	95,93506
45,00000	5,50000	0,37181	0,08553	3,63910	0,27479	18,37230	10,32193	18,92331	95,61259	3,63910	95,61259
46,00000	5,60000	0,36517	0,08386	3,65076	0,27392	18,75819	10,66902	18,98393	95,30725	3,65076	95,30725
47,00000	5,70000	0,35876	0,08225	3,66188	0,27308	19,13925	11,02235	19,04176	95,01783	3,66188	95,01783
48,00000	5,80000	0,35258	0,08071	3,67249	0,27229	19,51555	11,38193	19,09694	94,74326	3,67249	94,74326
49,00000	5,90000	0,34660	0,07923	3,68262	0,27155	19,88717	11,74774	19,14964	94,48252	3,68262	94,48252
50,00000	6,00000	0,34082	0,07780	3,69231	0,27083	20,25419	12,11979	19,20000	94,23472	3,69231	94,23472
51,00000	6,10000	0,33524	0,07642	3,70157	0,27016	20,61669	12,49809	19,24815	93,99900	3,70157	93,99900
52,00000	6,20000	0,32983	0,07509	3,71042	0,26951	20,97476	12,88262	19,29421	93,77459	3,71042	93,77459
53,00000	6,30000	0,32459	0,07381	3,71890	0,26890	21,32847	13,27340	19,33830	93,56079	3,71890	93,56079
54,00000	6,40000	0,31952	0,07257	3,72702	0,26831	21,67791	13,67042	19,38053	93,35693	3,72702	93,35693
55,00000	6,50000	0,31461	0,07137	3,73481	0,26775	22,02315	14,07369	19,42099	93,16241	3,73481	93,16241
56,00000	6,60000	0,30984	0,07022	3,74227	0,26722	22,36427	14,48320	19,45979	92,97666	3,74227	92,97666
57,00000	6,70000	0,30521	0,06910	3,74943	0,26671	22,70136	14,89895	19,49701	92,79916	3,74943	92,79916
58,00000	6,80000	0,30073	0,06801	3,75630	0,26622	23,03447	15,32095	19,53274	92,62944	3,75630	92,62944
59,00000	6,90000	0,29637	0,06697	3,76289	0,26575	23,36370	15,74919	19,56704	92,46705	3,76289	92,46705
60,00000	7,00000	0,29213	0,06595	3,76923	0,26531	23,68912	16,18367	19,60000	92,31156	3,76923	92,31156

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DOY	n2ref	DOY	n2ref	DOY	n2ref	DOY	n2ref	DOY	n2ref	DOY	n2ref
17,64700	25,10000	23,42107	13,00000	31,30715	17,00000	62,44397	7,60000	86,04800	25,90000	86,71892	16,00000
n1	u1	n1	u1	n1	u1	n1	u1	n1	u1	n1	u1
12,50000	370,45720	2,70000	417,85171	4,30000	371,59726	4,00000	445,50925	5,60000	361,00494	7,40000	423,00500
n2	u2	n2	u2	n2	u2	n2	u2	n2	u2	n2	u2
15,29786	302,70345	3,30434	341,42987	5,26246	303,63500	4,89532	364,02906	6,85344	294,97994	9,05633	345,64066
16,21622	285,56076	3,50270	322,09403	5,57838	286,43955	5,18919	343,41338	7,26486	278,27464	9,60000	326,06635
18,01706	257,01839	3,89168	289,90008	6,19787	257,80934	5,76546	309,08852	8,07164	250,46053	10,66610	293,47536
19,75806	234,37088	4,26774	264,35516	6,79677	235,09214	6,32258	281,85279	8,85161	228,39088	11,69677	267,61541
21,42857	216,10004	4,62857	243,74683	7,37143	216,76507	6,85714	259,88039	9,60000	210,58622	12,68571	246,75292
23,02158	201,14668	4,97266	226,88042	7,91942	201,76570	7,36691	241,89760	10,31367	196,01440	13,62878	229,67850
24,53311	188,75371	5,29915	212,90195	8,43939	189,33459	7,85059	226,99390	10,99083	183,93764	14,52360	215,52763
25,96154	178,36828	5,60769	201,18786	8,93077	178,91720	8,30769	214,50445	11,63077	173,81720	15,36923	203,66907
27,30711	169,57909	5,89834	191,27422	9,39365	170,10096	8,73828	203,93463	12,23359	165,25226	16,16581	193,63318
28,57143	162,07503	6,17143	182,81012	9,82857	162,57380	9,14286	194,91030	12,80000	157,93966	16,91429	185,06469
29,75709	155,61723	6,42753	175,52614	10,23644	156,09613	9,52227	187,14419	13,33117	151,64663	17,61619	177,69088
30,86735	150,01986	6,66735	169,21268	10,61837	150,48153	9,87755	180,41284	13,82857	146,19208	18,27347	171,29955
31,90591	145,13659	6,89168	163,70466	10,97563	145,58323	10,20989	174,54025	14,29385	141,43341	18,88830	165,72360
32,87671	140,85092	7,10137	158,87070	11,30959	141,28437	10,52055	169,38633	14,72877	137,25709	19,46301	160,83003
33,78378	137,06917	7,29730	154,60513	11,62162	137,49098	10,81081	164,83842	15,13514	133,57183	20,00000	156,51185
34,63115	133,71532	7,48033	150,82221	11,91311	134,12682	11,08197	160,80511	15,51475	130,30356	20,50164	152,68228
35,42274	130,72718	7,65131	147,45179	12,18542	131,12948	11,33528	157,21160	15,86939	127,39166	20,97026	149,27028
36,16236	128,05345	7,81107	144,43599	12,43985	128,44752	11,57196	153,99618	16,20074	124,78615	21,40812	146,21729
36,85364	125,65151	7,96039	141,72675	12,67765	126,03819	11,79316	151,10763	16,51043	122,44549	21,81735	143,47464
37,50000	123,48573	8,10000	139,28390	12,90000	123,86575	12,00000	148,50308	16,80000	120,33498	22,20000	141,00167
38,10468	121,52615	8,23061	137,07362	13,10801	121,90014	12,19350	146,14650	17,07090	118,42540	22,55797	138,76413
38,67069	119,74740	8,35287	135,06730	13,30272	120,11591	12,37462	144,00738	17,32447	116,69203	22,89305	136,73306
39,20086	118,12788	8,46739	133,24059	13,48510	118,49141	12,54428	142,05977	17,56199	115,11384	23,20691	134,88383
39,69780	116,64915	8,57473	131,57268	13,65604	117,00813	12,70330	140,28146	17,78462	113,67284	23,50110	133,19535
40,16393	115,29535	8,67541	130,04568	13,81639	115,65017	12,85246	138,65339	17,99344	112,35358	23,77705	131,64952
40,60150	114,05280	8,76992	128,64416	13,96692	114,40378	12,99248	137,15910	18,18947	111,14273	24,03609	130,23071
41,01258	112,90962	8,85872	127,35473	14,10833	113,25709	13,12403	135,78432	18,37364	110,02872	24,27945	128,92537
41,39908	111,85550	8,94220	126,16575	14,24128	112,19973	13,24771	134,51664	18,54679	109,00149	24,50826	127,72173
41,76277	110,88142	9,02076	125,06705	14,36639	111,22265	13,36409	133,34522	18,70972	108,05227	24,72356	126,60948
42,10526	109,97948	9,09474	124,04973	14,48421	110,31794	13,47368	132,26056	18,86316	107,17334	24,92632	125,57961
42,42807	109,14273	9,16446	123,10592	14,59525	109,47861	13,57698	131,25429	19,00777	106,35794	25,11742	124,62417
42,73256	108,36503	9,23023	122,22873	14,70000	108,69852	13,67442	130,31903	19,14419	105,60009	25,29767	123,73616
43,02001	107,64096	9,29232	121,41202	14,79888	107,97221	13,76640	129,44827	19,27296	104,89449	25,46785	122,90938
43,29159	106,96569	9,35098	120,65036	14,89231	107,29487	13,85331	128,63619	19,39463	104,23645	25,62862	122,13832
43,54839	106,33494	9,40645	119,93892	14,98065	106,66218	13,93548	127,87765	19,50968	103,62179	25,78065	121,41810
43,79139	105,74487	9,45894	119,27336	15,06424	106,07029	14,01325	127,16805	19,61854	103,04678	25,92450	120,74434
44,02152	105,19207	9,50865	118,64983	15,14340	105,51579	14,08689	126,50325	19,72164	102,50808	26,06074	120,11312
44,23963	104,67345	9,55576	118,06487	15,21843	104,99558	14,15668	125,87957	19,81935	102,00270	26,18986	119,52094
44,44650	104,18627	9,60044	117,51535	15,28960	104,50689	14,22288	125,29368	19,91203	101,52794	26,31233	118,96465
44,64286	103,72802	9,64286	116,99848	15,35714	104,04723	14,28571	124,74259	20,00000	101,08138	26,42857	118,44140
44,82937	103,29646	9,68314	116,51171	15,42130	103,61434	14,34540	124,22360	20,08356	100,66084	26,53899	117,94863
45,00666	102,88956	9,72144	116,05275	15,48229	103,20619	14,40213	123,73426	20,16298	100,26432	26,64394	117,48401
45,17530	102,50547	9,75786	115,61952	15,54030	102,82092	14,45610	123,27236	20,23853	99,89003	26,74378	117,04544
45,33582	102,14252	9,79254	115,21014	15,59552	102,45686	14,50746	122,83588	20,31045	99,53634	26,83881	116,63101
45,48872	101,79919	9,82556	114,82289	15,64812	102,11247	14,55639	122,42300	20,37895	99,20177	26,92932	116,23898
45,63446	101,47409	9,85704	114,45619	15,69825	101,78637	14,60303	122,03203	20,44424	98,88496	27,01560	115,86776
45,77346	101,16594	9,88707	114,10863	15,74607	101,47727	14,64751	121,66146	20,50651	98,58468	27,09789	115,51591
45,90611	100,87360	9,91572	113,77888	15,79170	101,18403	14,68996	121,30989	20,56594	98,29980	27,17642	115,18210
46,03280	100,59600	9,94308	113,46576	15,83528	100,90557	14,73049	120,97605	20,62269	98,02928	27,25141	114,86512
46,15385	100,33216	9,96923	113,16817	15,87692	100,64092	14,76923	120,65875	20,67692	97,77217	27,32308	114,56385
46,26958	100,08119	9,99423	112,88509	15,91674	100,38918	14,80627	120,35694	20,72877	97,52761	27,39159	114,27728
46,38031	99,84226	10,01815	112,61560	15,95483	100,14952	14,84170	120,06961	20,77838	97,29478	27,45714	114,00447
46,48630	99,61463	10,04104	112,35884	15,99129	99,92118	14,87561	119,79585	20,82586	97,07295	27,51989	113,74454
46,58781	99,39758	10,06297	112,11402	16,02621	99,70346	14,90810	119,53483	20,87134	96,86143	27,57998	113,49670
46,68508	99,19046	10,08398	111,88041	16,05967	99,49571	14,93923	119,28576	20,91492	96,65961	27,63757	113,26021
46,77835	98,99270	10,10412	111,65734	16,09175	99,29734	14,96907	119,04793	20,95670	96,46689	27,69278	113,03439
46,86782	98,80372	10,12345	111,44419	16,12253	99,10778	14,99770	118,82066	20,99678	96,28273	27,74575	112,81861
46,95370	98,62301	10,14200	111,24037	16,15207	98,92652	15,02518	118,60335	21,03526	96,10664	27,79659	112,61227
47,03616	98,45011	10,15981	111,04534	16,18044	98,75308	15,05157	118,39542	21,07220	95,93814	27,84541	112,41484
47,11538	98,28456	10,17692	110,85862	16,20769	98,58703	15,07692	118,19633	21,10769	95,77682	27,89231	112,22582

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DOY	n2ref	DOY	n2ref	DOY	n2ref	DOY	n2ref	DOY	n2ref	DOY	n2ref
97,70780	12,40000	98,43947	14,80000	101,55186	8,10000	101,64427	22,20000	108,00316	24,30000	111,62963	14,90000
n1	u1	n1	u1	n1	u1	n1	u1	n1	u1	n1	u1
4,10000	439,20680	5,50000	493,65756	3,20000	504,28212	11,80000	621,52233	5,70000	374,07284	6,60000	350,82624
n2	u2	n2	u2	n2	u2	n2	u2	n2	u2	n2	u2
5,01770	358,87928	6,73106	403,37142	3,91625	412,05283	14,44118	507,85072	6,97582	305,65782	8,07727	286,66284
5,31892	338,55524	7,13514	380,52771	4,15135	388,71747	15,30811	479,09013	7,39459	288,34781	8,56216	270,42856
5,90959	304,71596	7,92751	342,49319	4,61237	349,86437	17,00810	431,20410	8,21578	259,52687	9,51301	243,39868
6,48065	277,86552	8,69355	312,31397	5,05806	319,03563	18,65161	393,20801	9,00968	236,65833	10,43226	221,95129
7,02857	256,20396	9,42857	287,96691	5,48571	294,16457	20,22857	362,55469	9,77143	218,20916	11,31429	204,64864
7,55108	238,47557	10,12950	268,04063	5,89353	273,80943	21,73237	337,46720	10,49784	203,10986	12,15540	190,48768
8,04686	223,78270	10,79457	251,52622	6,28048	256,93959	23,15925	316,67531	11,18710	190,59594	12,95348	178,75143
8,51538	211,46994	11,42308	237,68698	6,64615	242,80250	24,50769	299,25149	11,83846	180,10915	13,70769	168,91634
8,95673	201,04965	12,01513	225,97483	6,99062	230,83829	25,77791	284,50572	12,45204	171,23417	14,41815	160,59290
9,37143	192,15297	12,57143	215,97518	7,31429	220,62343	26,97143	271,91602	13,02857	163,65687	15,08571	153,48648
9,76032	184,49673	13,09312	207,36976	7,61781	211,83280	28,09069	261,08166	13,56923	157,13604	15,71174	147,37089
10,12449	177,86060	13,58163	199,91091	7,90204	204,21342	29,13878	251,69086	14,07551	151,48404	16,29796	142,07013
10,46514	172,07109	14,03860	193,40365	8,16791	197,56611	30,11918	243,49812	14,54910	146,55311	16,84632	137,44563
10,78356	166,99008	14,46575	187,69272	8,41644	191,73227	31,03562	236,30797	14,99178	142,22561	17,35890	133,38706
11,08108	162,50651	14,86486	182,65330	8,64865	186,58439	31,89189	229,96326	15,40541	138,40695	17,83784	129,80571
11,35902	158,53026	15,23770	178,18409	8,86557	182,01899	32,69180	224,33646	15,79180	135,02037	18,28525	126,62959
11,61866	154,98758	15,58601	174,20221	9,06822	177,95141	33,43907	219,32321	16,15277	132,00307	18,70321	123,79979
11,86125	151,81766	15,91144	170,63929	9,25756	174,31181	34,13727	214,83744	16,49004	129,30324	19,09373	121,26774
12,08799	148,96996	16,21560	167,43855	9,43453	171,04218	34,78983	210,80766	16,80526	126,87786	19,45872	118,99309
12,30000	146,40227	16,50000	164,55252	9,60000	168,09404	35,40000	207,17411	17,10000	124,69095	19,80000	116,94208
12,49833	144,07902	16,76606	161,94126	9,75480	165,42658	35,97082	203,88649	17,37573	122,71224	20,11927	115,08634
12,68399	141,97017	17,01511	159,57095	9,89970	163,00526	36,50514	200,90224	17,63384	120,91612	20,41813	113,40184
12,85788	140,05010	17,24838	157,41285	10,03542	160,80070	37,00562	198,18515	17,87559	119,28080	20,69806	111,86815
13,02088	138,29695	17,46703	155,44235	10,16264	158,78780	37,47473	195,70426	18,10220	117,78764	20,96044	110,46778
13,17377	136,69191	17,67213	153,63832	10,28197	156,94495	37,91475	193,43297	18,31475	116,42063	21,20656	109,18572
13,31729	135,21876	17,86466	151,98254	10,39398	155,25352	38,32782	191,34831	18,51429	115,16594	21,43759	108,00900
13,45213	133,86343	18,04554	150,45918	10,49922	153,69738	38,71588	189,43038	18,70174	114,01161	21,65464	106,92640
13,57890	132,61369	18,21560	149,05450	10,59817	152,26247	39,08073	187,66187	18,87798	112,94720	21,85872	105,92814
13,69819	131,45884	18,37562	147,75648	10,69127	150,93651	39,42405	186,02764	19,04382	111,96362	22,05074	105,00568
13,81053	130,38952	18,52632	146,55459	10,77895	149,70876	39,74737	184,51444	19,20000	111,05287	22,23158	104,15154
13,91641	129,39748	18,66835	145,43956	10,86159	148,56973	40,05209	183,11061	19,34720	110,20796	22,40202	103,35913
14,01628	128,47546	18,80233	144,40323	10,93953	147,51110	40,33953	181,80585	19,48605	109,42267	22,56279	102,62264
14,11056	127,61701	18,92880	143,43836	11,01312	146,52546	40,61089	180,59106	19,61712	108,69153	22,71456	101,93694
14,19964	126,81643	19,04830	142,53852	11,08265	145,60625	40,86726	179,45815	19,74097	108,00967	22,85796	101,29745
14,28387	126,06862	19,16129	141,69800	11,14839	144,74765	41,10968	178,39993	19,85806	107,37276	22,99355	100,70012
14,36358	125,36905	19,26821	140,91171	11,21060	143,94442	41,33907	177,40997	19,96887	106,77694	23,12185	100,14133
14,43906	124,71365	19,36947	140,17506	11,26951	143,19192	41,55632	176,48252	20,07381	106,21874	23,24336	99,61782
14,51060	124,09880	19,46544	139,48397	11,32535	142,48596	41,76221	175,61243	20,17327	105,69506	23,35853	99,12668
14,57845	123,52120	19,55646	138,83476	11,37830	141,82278	41,95750	174,79507	20,26760	105,20312	23,46775	98,66531
14,64286	122,97790	19,64286	138,22412	11,42857	141,19899	42,14286	174,02625	20,35714	104,74040	23,57143	98,23135
14,70403	122,46625	19,72492	137,64904	11,47632	140,61154	42,31892	173,30222	20,44219	104,30462	23,66991	97,82266
14,76218	121,98384	19,80293	137,10682	11,52170	140,05765	42,48628	172,61955	20,52304	103,89375	23,76352	97,43732
14,81750	121,52847	19,87713	136,59500	11,56488	139,53481	42,64548	171,97516	20,59994	103,50592	23,85256	97,07358
14,87015	121,09817	19,94776	136,11134	11,60597	139,04075	42,79701	171,36624	20,67313	103,13943	23,93731	96,72987
14,92030	120,69112	20,01504	135,65383	11,64511	138,57339	42,94135	170,79023	20,74286	102,79274	24,01805	96,40473
14,96810	120,30569	20,07916	135,22061	11,68242	138,13085	43,07893	170,24480	20,80931	102,46447	24,09499	96,09686
15,01369	119,94036	20,14032	134,80999	11,71801	137,71139	43,21014	169,72782	20,87270	102,15332	24,16839	95,80504
15,05721	119,59377	20,19869	134,42043	11,75197	137,31344	43,33537	169,23735	20,93319	101,85812	24,23843	95,52819
15,09876	119,26464	20,25443	134,05051	11,78440	136,93556	43,45496	168,77161	20,99095	101,57781	24,30532	95,26530
15,13846	118,95184	20,30769	133,69892	11,81538	136,57641	43,56923	168,32897	21,04615	101,31139	24,36923	95,01544
15,17642	118,65430	20,35862	133,36449	11,84501	136,23478	43,67849	167,90791	21,09893	101,05797	24,43034	94,77777
15,21274	118,37103	20,40734	133,04611	11,87336	135,90954	43,78301	167,50706	21,14942	100,81672	24,48880	94,55150
15,24751	118,10115	20,45397	132,74277	11,90049	135,59967	43,88306	167,12515	21,19775	100,58686	24,54476	94,33593
15,28080	117,84382	20,49864	132,45353	11,92648	135,30421	43,97889	166,76100	21,24404	100,36769	24,59836	94,13038
15,31271	117,59827	20,54144	132,17754	11,95138	135,02228	44,07072	166,41352	21,28840	100,15856	24,64972	93,93424
15,34330	117,36380	20,58247	131,91400	11,97526	134,75307	44,15876	166,08173	21,33093	99,95886	24,69897	93,74696
15,37265	117,13975	20,62184	131,66218	11,99816	134,49583	44,24322	165,76467	21,37173	99,76803	24,74621	93,56799
15,40081	116,92551	20,65963	131,42138	12,02015	134,24985	44,32429	165,46150	21,41089	99,58557	24,79155	93,39686
15,42786	116,72052	20,69591	131,19098	12,04126	134,01448	44,40213	165,17142	21,44849	99,41098	24,83509	93,23312
15,45385	116,52425	20,73077	130,97037	12,06154	133,78913	44,47692	164,89368	21,48462	99,24381	24,87692	93,07635

EK Tablo 2 Devamı

DOY	n2ref	DOY	n2ref	DOY	n2ref	DOY	n2ref	DOY	n2ref	DOY	n2ref	DOY	n2ref	DOY	n2ref
294,67529	29,30000	298,33473	18,50000	301,11232	9,80000	304,53694	7,70000	323,73266	8,10000	334,72782	7,10000	363,19964	47,10000	364,81353	15,20000
n1	u1	n1	u1	n1	u1	n1	u1	n1	u1	n1	u1	n1	u1	n1	u1
9,80000	382,74422	4,90000	356,55251	3,20000	358,36285	2,80000	329,97133	3,50000	437,22127	4,20000	343,55148	12,40000	364,55558	6,20000	430,14458
n2	u2	n2	u2	n2	u2	n2	u2	n2	u2	n2	u2	n2	u2	n2	u2
11,99352	312,74327	5,99676	291,34182	3,91625	292,82106	3,42672	269,62213	4,28340	357,25689	5,14008	280,71858	15,17548	297,88119	7,58774	351,47447
12,71351	295,03200	6,35676	274,84256	4,15135	276,23803	3,63243	254,35290	4,54054	337,02473	5,44865	264,82093	16,08649	281,01159	8,04324	331,56978
14,12537	265,54296	7,06269	247,37149	4,61237	248,62748	4,03582	228,92981	5,04478	303,33843	6,05373	238,35155	17,87292	252,92391	8,93646	298,42871
15,49032	242,14430	7,74516	225,57403	5,05806	226,71935	4,42581	208,75737	5,53226	276,60938	6,63871	217,34890	19,60000	230,63720	9,80000	272,13229
16,80000	223,26746	8,40000	207,98896	5,48571	209,04499	4,80000	192,48328	6,00000	255,04574	7,20000	200,40503	21,25714	212,65742	10,62857	250,91767
18,04892	207,81815	9,02446	193,59687	5,89353	194,57983	5,15683	179,16412	6,44604	237,39749	7,73525	186,53772	22,83741	197,94229	11,41871	233,55507
19,23396	195,01414	9,61698	181,66905	6,28048	182,59145	5,49542	168,12553	6,86927	222,77105	8,24312	175,04483	24,33684	185,74674	12,16842	219,16536
20,35385	184,28426	10,17692	171,67343	6,64615	172,54507	5,81538	158,87509	7,26923	210,51395	8,72308	165,41368	25,75385	175,52676	12,87692	207,10665
21,40877	175,20355	10,70439	163,21413	6,99062	164,04283	6,11679	151,04643	7,64599	200,14076	9,17519	157,26283	27,08865	166,87759	13,54433	196,90136
22,40000	167,45060	11,20000	155,99172	7,31429	156,78375	6,40000	144,36246	8,00000	191,28431	9,60000	150,30377	28,34286	159,49307	14,17143	188,18825
23,32955	160,77861	11,66478	149,77631	7,61781	150,53677	6,66559	138,61041	8,33198	183,66268	9,99838	144,31499	29,51903	153,13814	14,75951	180,68999
24,20000	154,99559	12,10000	144,38903	7,90204	145,12214	6,91429	133,62475	8,64286	177,05655	10,37143	139,12415	30,62041	147,62995	15,31020	174,19078
25,01423	149,95036	12,50712	139,68905	8,16791	140,39830	7,14692	129,27516	8,93366	171,29321	10,72039	134,59555	31,65066	142,82447	15,82533	168,52073
25,77534	145,52254	12,88767	135,56423	8,41644	136,25254	7,36438	125,45785	9,20548	166,23517	11,04658	130,62114	32,61370	138,60707	16,30685	163,54455
26,48649	141,61536	13,24324	131,92443	8,64865	132,59425	7,56757	122,08939	9,45946	161,77187	11,35135	127,11405	33,51351	134,88556	16,75676	159,15349
27,15082	138,15028	13,57541	128,69647	8,86557	129,34990	7,75738	119,10208	9,69672	157,81359	11,63607	124,00379	34,35410	131,58515	17,17705	155,25929
27,77143	135,06303	13,88571	125,82048	9,06822	126,45932	7,93469	116,44050	9,91837	154,28693	11,90204	121,23267	35,13936	128,64461	17,56968	151,78970
28,35129	132,30062	14,17565	123,24710	9,25756	123,87287	8,10037	114,05897	10,12546	151,13133	12,15055	118,75313	35,87306	126,01347	17,93653	148,68518
28,89325	129,81901	14,44663	120,93532	9,43453	121,54935	8,25521	111,91953	10,31902	148,29651	12,38282	116,52564	36,55881	123,64980	18,27940	145,89624
29,40000	127,58141	14,70000	118,85084	9,60000	119,45428	8,40000	109,99044	10,50000	145,74042	12,60000	114,51716	37,20000	121,51853	18,60000	143,38153
29,87407	125,55683	14,93703	116,96481	9,75480	117,55868	8,53545	108,24502	10,66931	143,42769	12,80317	112,69990	37,79984	119,59016	18,89992	141,10622
30,31782	123,71908	15,15891	115,25281	9,89970	115,83799	8,66224	106,66066	10,82779	141,32836	12,99335	111,05033	38,36133	117,83974	19,18066	139,04088
30,73348	122,04585	15,36674	113,69408	10,03542	114,27135	8,78099	105,21813	10,97624	139,41698	13,17149	109,54844	38,88726	116,24603	19,44363	137,16043
31,12308	120,51808	15,56154	112,27086	10,16264	112,84090	8,89231	103,90101	11,11538	137,67175	13,33846	108,17711	39,38022	114,79086	19,69011	135,44345
31,48852	119,11938	15,74426	110,96787	10,28197	111,53129	8,99672	102,69516	11,24590	136,07397	13,49508	106,92163	39,84262	113,45862	19,92131	133,87153
31,83158	117,83561	15,91579	109,77195	10,39398	110,32930	9,09474	101,58840	11,36842	134,60747	13,64211	105,76932	40,27669	112,23586	20,13835	132,42877
32,15386	116,65451	16,07693	108,67168	10,49922	109,22345	9,18682	100,57015	11,48352	133,25827	13,78023	104,70917	40,68448	111,11089	20,34224	131,10141
32,45688	115,56543	16,22844	107,65713	10,59817	108,20374	9,27339	99,63123	11,59174	132,01418	13,91009	103,73161	41,06789	110,07357	20,53394	129,87745
32,74201	114,55904	16,37100	106,71961	10,69127	107,26146	9,35486	98,76361	11,69357	130,86455	14,03229	102,82828	41,42867	109,11501	20,71433	128,74643
33,01053	113,62719	16,50526	105,85153	10,77895	106,38897	9,43158	97,96024	11,78947	129,80006	14,14737	101,99185	41,76842	108,22744	20,88421	127,69917
33,26360	112,76269	16,63180	105,04618	10,86159	105,57954	9,50389	97,21493	11,87986	128,81251	14,25583	101,21587	42,08864	107,40402	21,04432	126,72760
33,50233	111,95919	16,75116	104,29767	10,93953	104,82723	9,57209	96,52223	11,96512	127,89466	14,35814	100,49465	42,39070	106,63871	21,19535	125,82461
33,72769	111,21111	16,86384	103,60078	11,01312	104,12679	9,63648	95,87728	12,04560	127,04009	14,45472	99,82317	42,67585	105,92617	21,33792	124,98387
33,94061	110,51344	16,97030	102,95085	11,08265	103,47357	9,69732	95,27581	12,12165	126,24313	14,54597	99,19694	42,94526	105,26166	21,47263	124,19980
34,14194	109,86177	17,07097	102,34378	11,14839	102,86341	9,75484	94,71399	12,19355	125,49870	14,63226	98,61200	43,20000	104,64095	21,60000	123,46743
34,33245	109,25213	17,16623	101,77586	11,21060	102,29261	9,80927	94,18841	12,26159	124,80229	14,71391	98,06479	43,44106	104,06029	21,72053	122,78229
34,51287	108,68099	17,25644	101,24380	11,26951	101,75785	9,86082	93,69602	12,32603	124,14986	14,79123	97,55214	43,66935	103,51629	21,83468	122,14042
34,68387	108,14518	17,34194	100,74465	11,32535	101,25617	9,90968	93,23409	12,38710	123,53778	14,86452	97,07119	43,88571	103,00594	21,94286	121,53825
34,84606	107,64183	17,42303	100,27575	11,37830	100,78489	9,95602	92,80014	12,44502	122,96279	14,93402	96,61938	44,09093	102,52651	22,04546	120,97256
35,00000	107,16838	17,50000	99,83470	11,42857	100,34160	10,00000	92,39197	12,50000	122,42196	15,00000	96,19441	44,28571	102,07556	22,14286	120,44048
35,14623	106,72251	17,57311	99,41934	11,47632	99,92413	10,04178	92,00758	12,55222	121,91262	15,06267	95,79420	44,47073	101,65088	22,23537	119,93939
35,28522	106,30211	17,64261	99,02771	11,52170	99,53051	10,08149	91,64514	12,60186	121,43239	15,12224	95,41685	44,64660	101,25046	22,32330	119,46693
35,41743	105,90529	17,70872	98,65804	11,56488	99,15896	10,11927	91,30303	12,64908	120,97908	15,17890	95,06066	44,81390	100,87249	22,40695	119,02096
35,54328	105,53030	17,77164	98,30872	11,60597	98,80786	10,15522	90,97975	12,69403	120,55072	15,23284	94,72407	44,97313	100,51532	22,48657	118,59953
35,66316	105,17558	17,83158	97,97827	11,64511	98,47574	10,18947	90,67394	12,73684	120,14551	15,28421	94,40568	45,12481	100,17746	22,56241	118,20089
35,77742	104,83970	17,88871	97,66537	11,68242	98,16125	10,22212	90,38437	12,77765	119,76182	15,33318	94,10418	45,26938	99,85754	22,63469	117,82340
35,88639	104,52133	17,94320	97,36879	11,71801	97,86317	10,25325	90,10990	12,81657	119,39814	15,37988	93,81842	45,40727	99,55431	22,70363	117,46561
35,99039	104,21929	17,99520	97,08742	11,75197	97,58037	10,28297	89,84951	12,85371	119,05312	15,42445	93,54731	45,53886	99,26662	22,76943	117,12617
36,08971	103,93248	18,04486	96,82024	11,78440	97,31183	10,31135	89,60224	12,88918	118,72548	15,46702	93,28987	45,66453	98,99344	22,83227	116,80384
36,18462	103,65989	18,09231	96,56630	11,81538	97,05660	10,33846	89,36724	12,92308	118,41409	15,50769	93,04519	45,78462	98,73380	22,89231	116,49749
36,27535	103,40060	18,13768	96,32475	11,84501	96,81383	10,36439	89,14369	12,95548	118,11789	15,54658	92,81245	45,89943	98,48683	22,94971	116,20608
36,36216	103,15375	18,18108	96,09480	11,87336	96,58270	10,38919	88,93088	12,98649	117,83591	15,58378	92,59088	46,00927	98,25171	23,00463	115,92866
36,44526	102,91856	18,22263	95,87570	11,90049	96,36250	10,41293	88,72812	13,01616	117,56725	15,61940	92,37977	46,11441	98,02770	23,05720	115,66435
36,52484	102,69431	18,26242	95,66680	11,92648	96,15253	10,43567	88,53479	13,04459	117,31108	15,65350	92,17849	46,21510	97,81411	23,10755	115,41233
36,60110	102,48033	18,30055	95,46746	11,95138	95,95218	10,45746	88,35031	13,07182	117,06664	15,68619	91,98642	46,31160	97,61030	23,15580	115,17185
36,67423	102,27600	18,33711	95,27712	11,97526	95,76087	10,47835	88,17416	13,09794	116,83323	15,71753	91,80301	46,40412	97,41568	23,20206	114,94222
36,74437	102,08076	18,37219	95,09523	11,99816	95,57806	10,49839	88,00583	13,12299	116,61020	15,74759	91,62776	46,49288	97,22971	23,24644	114,72279
36,81170	101,89406	18,40585	94,92131	12,02015	95,40326	10,51763	87,84488	13,14703	116,39693	15,77644	91,46018	46,57807	97,05189	23,28903	114,51297
36,87635	101,71542	18,43817	94,75490	12,04126	95,23600	10,53610	87,69087	13,17012	116,19286	15,80415	91,29983	46,65987	96,88174	23,32993	114,31221
36,93846	101,54439	18,46923	94,59556	12,06154	95,07586	10,55385	87,54341	13,19231	115,99748	15,83077	91,14631	46,73846	96,71883	23,36923	114,11999

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2002								DOY	n2ref	DOY	n2ref
								17,23905	9,00000	48,08993	37,10000
								n1	u1	n1	u1
			Re1=1e13	Re1=1e13	Re1=1e13	Re1=1e13	Re1=1e13	4,50000	364,72758	10,20000	363,54385
step	Mach	Re2/Re1	M2/M1	Kappa	U2/U1	S2-S1	Cs2^2/Cs1^2	n2	u2	n2	u2
1,00000	1,15000	1,77820	0,76312	1,22383	0,81711	0,02571	1,14650	5,50723	298,02174	12,48305	297,05450
2,00000	1,20000	1,70411	0,70520	1,29730	0,77083	0,05550	1,19479	5,83784	281,14418	13,23243	280,23172
3,00000	1,30000	1,57303	0,61033	1,44136	0,69379	0,15718	1,29218	6,48614	253,04325	14,70192	252,22199
4,00000	1,40000	1,46067	0,53626	1,58065	0,63265	0,31681	1,39184	7,11290	230,74602	16,12258	229,99713
5,00000	1,50000	1,36329	0,47712	1,71429	0,58333	0,53199	1,49479	7,71429	212,75776	17,48571	212,06725
6,00000	1,60000	1,27808	0,42902	1,84173	0,54297	0,79777	1,60176	8,28777	198,03568	18,78561	197,39295
7,00000	1,70000	1,20290	0,38927	1,96265	0,50952	1,10824	1,71325	8,83192	185,83438	20,01902	185,23125
8,00000	1,80000	1,13608	0,35596	2,07692	0,48148	1,45739	1,82963	9,34615	175,60958	21,18462	175,03963
9,00000	1,90000	1,07628	0,32771	2,18457	0,45776	1,83948	1,95119	9,83056	166,95632	22,28260	166,41446
10,00000	2,00000	1,02247	0,30349	2,28571	0,43750	2,24924	2,07812	10,28571	159,56832	23,31429	159,05043
11,00000	2,10000	0,97378	0,28253	2,38057	0,42007	2,68195	2,21061	10,71255	153,21040	24,28178	152,71315
12,00000	2,20000	0,92952	0,26424	2,46939	0,40496	3,13341	2,34876	11,11224	147,69960	25,18776	147,22024
13,00000	2,30000	0,88910	0,24815	2,55247	0,39178	3,59997	2,49268	11,48613	142,89186	26,03522	142,42810
14,00000	2,40000	0,85206	0,23389	2,63014	0,38021	4,07845	2,64245	11,83562	138,67247	26,82740	138,22240
15,00000	2,50000	0,81797	0,22119	2,70270	0,37000	4,56609	2,79812	12,16216	134,94921	27,56757	134,51122
16,00000	2,60000	0,78651	0,20980	2,77049	0,36095	5,06053	2,95976	12,46721	131,64723	28,25902	131,21997
17,00000	2,70000	0,75738	0,19954	2,83382	0,35288	5,55974	3,12740	12,75219	128,70531	28,90496	128,28759
18,00000	2,80000	0,73033	0,19025	2,89299	0,34566	6,06199	3,30108	13,01845	126,07293	29,50849	125,66375
19,00000	2,90000	0,70515	0,18180	2,94829	0,33918	6,56580	3,48083	13,26731	123,70814	30,07257	123,30664
20,00000	3,00000	0,68165	0,17408	3,00000	0,33333	7,06992	3,66667	13,50000	121,57586	30,60000	121,18128
21,00000	3,10000	0,65966	0,16700	3,04837	0,32804	7,57329	3,85861	13,71768	119,64659	31,09342	119,25827
22,00000	3,20000	0,63904	0,16049	3,09366	0,32324	8,07502	4,05669	13,92145	117,89534	31,55529	117,51271
23,00000	3,30000	0,61968	0,15448	3,13607	0,31887	8,57435	4,26091	14,11231	116,30088	31,98790	115,92342
24,00000	3,40000	0,60145	0,14891	3,17582	0,31488	9,07066	4,47128	14,29121	114,84502	32,39341	114,47228
25,00000	3,50000	0,58427	0,14374	3,21311	0,31122	9,56342	4,68782	14,45902	113,51216	32,77377	113,14375
26,00000	3,60000	0,56804	0,13893	3,24812	0,30787	10,05221	4,91053	14,61654	112,28882	33,13083	111,92438
27,00000	3,70000	0,55269	0,13444	3,28101	0,30478	10,53666	5,13943	14,76453	111,16332	33,46627	110,80254
28,00000	3,80000	0,53814	0,13024	3,31193	0,30194	11,01648	5,37452	14,90367	110,12550	33,78165	109,76809
29,00000	3,90000	0,52434	0,12630	3,34102	0,29931	11,49146	5,61580	15,03460	109,16649	34,07842	108,81219
30,00000	4,00000	0,51123	0,12260	3,36842	0,29687	11,96141	5,86328	15,15789	108,27850	34,35789	107,92708
31,00000	4,10000	0,49876	0,11912	3,39425	0,29462	12,42618	6,11697	15,27410	107,45469	34,62130	107,10594
32,00000	4,20000	0,48689	0,11584	3,41860	0,29252	12,88568	6,37687	15,38372	106,68902	34,86977	106,34276
33,00000	4,30000	0,47557	0,11273	3,44160	0,29056	13,33983	6,64298	15,48720	105,97615	35,10433	105,63220
34,00000	4,40000	0,46476	0,10980	3,46333	0,28874	13,78858	6,91532	15,58497	105,31132	35,32594	104,96953
35,00000	4,50000	0,45443	0,10702	3,48387	0,28704	14,23192	7,19387	15,67742	104,69032	35,53548	104,35055
36,00000	4,60000	0,44455	0,10438	3,50331	0,28544	14,66983	7,47864	15,76490	104,10939	35,73377	103,77150
37,00000	4,70000	0,43509	0,10187	3,52172	0,28395	15,10233	7,76964	15,84775	103,56513	35,92156	103,22901
38,00000	4,80000	0,42603	0,09948	3,53917	0,28255	15,52944	8,06686	15,92627	103,05454	36,09954	102,72007
39,00000	4,90000	0,41733	0,09721	3,55572	0,28124	15,95120	8,37032	16,00074	102,57489	36,26835	102,24198
40,00000	5,00000	0,40899	0,09504	3,57143	0,28000	16,36765	8,68000	16,07143	102,12372	36,42857	101,79228
41,00000	5,10000	0,40097	0,09297	3,58635	0,27884	16,77884	8,99592	16,13857	101,69884	36,58077	101,36877
42,00000	5,20000	0,39326	0,09099	3,60053	0,27774	17,18483	9,31807	16,20240	101,29823	36,72543	100,96946
43,00000	5,30000	0,38584	0,08909	3,61402	0,27670	17,58569	9,64645	16,26311	100,92008	36,86304	100,59254
44,00000	5,40000	0,37869	0,08727	3,62687	0,27572	17,98149	9,98107	16,32090	100,56275	36,99403	100,23637
45,00000	5,50000	0,37181	0,08553	3,63910	0,27479	18,37230	10,32193	16,37594	100,22473	37,11880	99,89945
46,00000	5,60000	0,36517	0,08386	3,65076	0,27392	18,75819	10,66902	16,42841	99,90465	37,23772	99,58041
47,00000	5,70000	0,35876	0,08225	3,66188	0,27308	19,13925	11,02235	16,47844	99,60128	37,35114	99,27802
48,00000	5,80000	0,35258	0,08071	3,67249	0,27229	19,51555	11,38193	16,52620	99,31346	37,45939	98,99113
49,00000	5,90000	0,34660	0,07923	3,68262	0,27155	19,88717	11,74774	16,57181	99,04015	37,56276	98,71871
50,00000	6,00000	0,34082	0,07780	3,69231	0,27083	20,25419	12,11979	16,61538	98,78039	37,66154	98,45979
51,00000	6,10000	0,33524	0,07642	3,70157	0,27016	20,61669	12,49809	16,65705	98,53330	37,75598	98,21351
52,00000	6,20000	0,32983	0,07509	3,71042	0,26951	20,97476	12,88262	16,69691	98,29807	37,84633	97,97904
53,00000	6,30000	0,32459	0,07381	3,71890	0,26890	21,32847	13,27340	16,73507	98,07395	37,93282	97,75565
54,00000	6,40000	0,31952	0,07257	3,72702	0,26831	21,67791	13,67042	16,77161	97,86026	38,01565	97,54265
55,00000	6,50000	0,31461	0,07137	3,73481	0,26775	22,02315	14,07369	16,80663	97,65635	38,09503	97,33940
56,00000	6,60000	0,30984	0,07022	3,74227	0,26722	22,36427	14,48320	16,84021	97,46164	38,17113	97,14533
57,00000	6,70000	0,30521	0,06910	3,74943	0,26671	22,70136	14,89895	16,87242	97,27558	38,24414	96,95987
58,00000	6,80000	0,30073	0,06801	3,75630	0,26622	23,03447	15,32095	16,90333	97,09768	38,31422	96,78254
59,00000	6,90000	0,29637	0,06697	3,76289	0,26575	23,36370	15,74919	16,93302	96,92745	38,38151	96,61287
60,00000	7,00000	0,29213	0,06595	3,76923	0,26531	23,68912	16,18367	16,96154	96,76446	38,44615	96,45041

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DOY	n2ref	DOY	n2ref	DOY	n2ref	DOY	n2ref	DOY	n2ref	DOY	n2ref	DOY	n2ref
79,54544	0,59735	81,14098	7,50000	82,45376	11,20000	84,04006	1,80000	107,43095	51,50000	109,33502	2,50000	113,17741	14,20000
n1	u1	n1	u1	n1	u1	n1	u1	n1	u1	n1	u1	n1	u1
0,34668	423,08733	6,30000	430,62845	3,30000	394,63419	1,00000	402,74069	12,00000	346,86097	1,10000	428,37596	5,10000	427,84701
n2	u2	n2	u2	n2	u2	n2	u2	n2	u2	n2	u2	n2	u2
0,42427	345,70794	7,71012	351,86984	4,03864	322,45865	1,22383	329,08254	14,68595	283,42278	1,34621	350,02931	6,24153	349,59710
0,44974	326,12982	8,17297	331,94276	4,28108	304,19718	1,29730	310,44595	15,56757	267,37199	1,42703	330,20647	6,61622	329,79873
0,49969	293,53248	9,08060	298,76441	4,75650	273,79206	1,44136	279,41625	17,29638	240,64762	1,58550	297,20166	7,35096	296,83468
0,54797	267,66750	9,95806	272,43841	5,21613	249,66653	1,58065	254,79513	18,96774	219,44265	1,73871	271,01336	8,06129	270,67872
0,59431	246,80094	10,80000	251,19993	5,65714	230,20327	1,71429	234,93207	20,57143	202,33556	1,88571	249,88597	8,74286	249,57742
0,63849	229,72320	11,60288	233,81779	6,07770	214,27403	1,84173	218,67561	22,10072	188,33467	2,02590	232,59476	9,39281	232,30755
0,68041	215,56958	12,36469	219,41190	6,47674	201,07226	1,96265	205,20265	23,55178	176,73106	2,15891	218,26422	10,00951	217,99471
0,72002	203,70872	13,08462	207,33962	6,85385	190,00905	2,07692	193,91218	24,92308	167,00713	2,28462	206,25509	10,59231	206,00041
0,75734	193,67086	13,76278	197,12286	7,20908	180,64626	2,18457	184,35706	26,21483	158,77777	2,40303	196,09176	11,14130	195,84963
0,79241	185,10071	14,40000	188,39995	7,54286	172,65246	2,28571	176,19905	27,42857	151,75167	2,51429	187,41448	11,65714	187,18306
0,82529	177,72546	14,99757	180,89324	7,85587	165,77320	2,38057	169,17849	28,56680	145,70520	2,61862	179,94704	12,14089	179,72485
0,85608	171,33289	15,55714	174,38673	8,14898	159,81054	2,46939	163,09334	29,63265	140,46436	2,71633	173,47456	12,59388	173,26036
0,88489	165,75586	16,08058	168,71029	8,42316	154,60857	2,55247	157,78451	30,62967	135,89213	2,80772	167,82782	13,01761	167,62059
0,91181	160,86133	16,56986	163,72852	8,67945	150,04321	2,63014	153,12536	31,56164	131,87943	2,89315	162,87211	13,41370	162,67100
0,93697	156,54231	17,02703	159,33253	8,91892	146,01465	2,70270	149,01405	32,43243	128,33856	2,97297	158,49910	13,78378	158,30339
0,96047	152,71200	17,45410	155,43394	9,14262	142,44192	2,77049	145,36794	33,24590	125,19834	3,04754	154,62091	14,12951	154,42998
0,98242	149,29934	17,85306	151,96045	9,35160	139,25877	2,83382	142,11940	34,00583	122,40053	3,11720	151,16559	14,45248	150,97893
1,00294	146,24575	18,22583	148,85244	9,54686	136,41054	2,89299	139,21266	34,71587	119,89709	3,18229	148,07383	14,75424	147,89099
1,02211	143,50257	18,57423	146,06036	9,72936	133,85184	2,94829	136,60140	35,37949	117,64815	3,24312	145,29636	15,03628	145,11695
1,04003	141,02911	18,90000	143,54282	9,90000	131,54473	3,00000	134,24690	36,00000	115,62032	3,30000	142,79199	15,30000	142,61567
1,05680	138,79114	19,20476	141,26495	10,05964	129,45726	3,04837	132,11655	36,58049	113,78556	3,35321	140,52604	15,54671	140,35252
1,07250	136,75967	19,49003	139,19728	10,20906	127,56242	3,09366	130,18278	37,12387	112,12010	3,40302	138,46918	15,77764	138,29820
1,08721	134,91008	19,75724	137,31472	10,34903	125,83721	3,13607	128,42213	37,63283	110,60374	3,44968	136,59647	15,99395	136,42780
1,10099	133,22127	20,00769	135,59581	10,48022	124,26198	3,17582	126,81454	38,10989	109,21920	3,49341	134,88655	16,19670	134,71999
1,11392	131,67514	20,24262	134,02212	10,60328	122,81982	3,21311	125,34276	38,55738	107,95163	3,53443	133,32109	16,38689	133,15647
1,12605	130,25605	20,46316	132,57774	10,71880	121,49617	3,24812	123,99192	38,97744	106,78821	3,57293	131,88426	16,56541	131,72142
1,13745	128,95047	20,67034	131,24888	10,82732	120,27839	3,28101	122,74912	39,37208	105,71785	3,60911	130,56236	16,73313	130,40114
1,14817	127,74659	20,86514	130,02355	10,92936	119,15547	3,31193	121,60314	39,74312	104,73087	3,64312	129,34343	16,89083	129,18372
1,15826	126,63413	21,04843	128,89126	11,02537	118,11783	3,34102	120,54418	40,09226	103,81884	3,67512	128,21706	17,03921	128,05874
1,16776	125,60405	21,22105	127,84282	11,11579	117,15702	3,36842	119,56364	40,42105	102,97435	3,70526	127,17411	17,17895	127,01708
1,17671	124,64842	21,38375	126,87016	11,20101	116,26566	3,39425	118,65397	40,73094	102,19089	3,73367	126,20654	17,31065	126,05070
1,18516	123,76024	21,53721	125,96614	11,28140	115,43721	3,41860	117,80850	41,02326	101,46273	3,76047	125,30725	17,43488	125,15253
1,19313	122,93330	21,68208	125,12446	11,35728	114,66588	3,44160	117,02133	41,29921	100,78478	3,78576	124,46997	17,55216	124,31628
1,20066	122,16210	21,81896	124,33952	11,42898	113,94654	3,46333	116,28721	41,55993	100,15252	3,80966	123,68913	17,66297	123,53640
1,20778	121,44173	21,94839	123,60631	11,49677	113,27463	3,48387	115,60149	41,80645	99,56194	3,83226	122,95977	17,76774	122,80794
1,21452	120,76784	22,07086	122,92041	11,56093	112,64605	3,50331	114,96001	42,03974	99,00946	3,85364	122,27745	17,86689	122,12646
1,22090	120,13650	22,18685	122,27782	11,62168	112,05717	3,52172	114,35903	42,26066	98,49187	3,87389	121,63822	17,96078	121,48802
1,22695	119,54421	22,29677	121,67497	11,67926	111,50471	3,53917	113,79522	42,47005	98,00629	3,89309	121,03852	18,04977	120,88906
1,23269	118,98781	22,40104	121,10865	11,73388	110,98573	3,55572	113,26558	42,66864	97,55013	3,91129	120,47516	18,13417	120,32640
1,23814	118,46445	22,50000	120,57597	11,78571	110,49757	3,57143	112,76739	42,85714	97,12107	3,92857	119,94527	18,21429	119,79716
1,24331	117,97158	22,59400	120,07431	11,83495	110,03785	3,58635	112,29822	43,03619	96,71700	3,94498	119,44624	18,29038	119,29875
1,24823	117,50687	22,68336	119,60132	11,88176	109,60439	3,60053	111,85586	43,20639	96,33602	3,96059	118,97572	18,36272	118,82881
1,25290	117,06822	22,76835	119,15485	11,92628	109,19524	3,61402	111,43830	43,36829	95,97639	3,97543	118,53158	18,43152	118,38522
1,25735	116,65371	22,84925	118,73295	11,96866	108,80860	3,62687	111,04373	43,52239	95,63656	3,98955	118,11189	18,49701	117,96605
1,26160	116,26160	22,92632	118,33385	12,00902	108,44286	3,63910	110,67048	43,66917	95,31510	4,00301	117,71488	18,55940	117,56953
1,26564	115,89031	22,99977	117,95594	12,04750	108,09654	3,65076	110,31704	43,80908	95,01070	4,01583	117,33895	18,61886	117,19406
1,26949	115,53839	23,06982	117,59775	12,08419	107,76829	3,66188	109,98205	43,94252	94,72219	4,02806	116,98263	18,67557	116,83818
1,27317	115,20452	23,13668	117,25792	12,11921	107,45687	3,67249	109,66423	44,06987	94,44847	4,03974	116,64458	18,72969	116,50055
1,27668	114,88747	23,20053	116,93523	12,15266	107,16115	3,68262	109,36243	44,19148	94,18855	4,05089	116,32358	18,78138	116,17994
1,28004	114,58615	23,26154	116,62854	12,18462	106,88009	3,69231	109,07560	44,30769	93,94151	4,06154	116,01849	18,83077	115,87523
1,28325	114,29953	23,31987	116,33680	12,21517	106,61274	3,70157	108,80276	44,41880	93,70653	4,07172	115,72828	18,87799	115,58538
1,28632	114,02666	23,37568	116,05907	12,24440	106,35822	3,71042	108,54302	44,52510	93,48282	4,08147	115,45200	18,92317	115,30944
1,28926	113,76668	23,42909	115,79446	12,27238	106,11573	3,71890	108,29554	44,62684	93,26968	4,09079	115,18877	18,96641	115,04654
1,29208	113,51879	23,48025	115,54215	12,29918	105,88451	3,72702	108,05957	44,72429	93,06646	4,09973	114,93779	19,00783	114,79586
1,29478	113,28226	23,52928	115,30140	12,32486	105,66389	3,73481	107,83441	44,81768	92,87254	4,10829	114,69830	19,04751	114,55667
1,29736	113,05639	23,57629	115,07151	12,34948	105,45321	3,74227	107,61941	44,90722	92,68737	4,11649	114,46961	19,08557	114,32826
1,29984	112,84057	23,62138	114,85184	12,37311	105,25190	3,74943	107,41396	44,99311	92,51042	4,12437	114,25108	19,12207	114,11001
1,30223	112,63419	23,66466	114,64179	12,39578	105,05940	3,75630	107,21751	45,07555	92,34123	4,13193	114,04213	19,15711	113,90131
1,30451	112,43672	23,70622	114,44080	12,41755	104,87522	3,76289	107,02954	45,15471	92,17934	4,13918	113,84219	19,19075	113,70162
1,30671	112,24766	23,74615	114,24836	12,43846	104,69887	3,76923	106,84957	45,23077	92,02434	4,14615	113,65076	19,22308	113,51043

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DOY	n2ref	DOY	n2ref	DOY	n2ref	DOY	n2ref	DOY	n2ref	DOY	n2ref	DOY	n2ref
138,80516	20,10000	140,12294	7,00000	141,87461	18,30000	143,42774	21,20000	150,06423	3,70000	198,64322	18,80000	200,39748	4,40000
n1	u1	n1	u1	n1	u1	n1	u1	n1	u1	n1	u1	n1	u1
7,60000	348,92264	4,90000	435,36495	16,40000	364,67093	11,80000	425,89930	2,10000	462,30737	7,00000	412,36962	1,60000	444,30833
n2	u2	n2	u2	n2	u2	n2	u2	n2	u2	n2	u2	n2	u2
9,30110	285,10739	5,99676	355,74008	20,07079	297,97545	14,44118	348,00562	2,57004	377,75493	8,56680	336,95041	1,95813	363,04778
9,85946	268,96120	6,35676	335,59382	21,27568	281,10051	15,30811	328,29737	2,72432	356,36193	9,08108	317,86825	2,07568	342,48767
10,95437	242,07799	7,06269	302,05054	23,63838	253,00395	17,00810	295,48339	3,02687	320,74283	10,08955	286,09667	2,30618	308,25533
12,01290	220,74698	7,74516	275,43497	25,92258	230,71018	18,65161	269,44649	3,31935	292,48017	11,06452	260,88690	2,52903	281,09302
13,02857	203,53821	8,40000	253,96289	28,11429	212,72471	20,22857	248,44126	3,60000	269,67930	12,00000	240,54894	2,74286	259,17986
13,99712	189,45409	9,02446	236,38956	30,20432	198,00492	21,73237	231,25001	3,86763	251,01845	12,89209	223,90381	2,94676	241,24554
14,91613	177,78152	9,61698	221,82522	32,18744	185,80552	23,15925	217,00232	4,12156	235,55280	13,73854	210,10874	3,14024	226,38201
15,78462	167,99979	10,17692	209,62016	34,06154	175,58230	24,50769	205,06262	4,36154	222,59244	14,53846	198,54833	3,32308	213,92623
16,60272	159,72151	10,70439	199,29102	35,82693	166,93039	25,77791	194,95806	4,58759	211,62408	15,29198	188,76476	3,49531	203,38491
17,37143	152,65366	11,20000	190,47217	37,48571	159,54353	26,97143	186,33094	4,80000	202,25947	16,00000	180,41171	3,65714	194,38489
18,09231	146,57125	11,66478	182,88290	39,04130	153,18660	28,09069	178,90668	4,99919	194,20054	16,66397	173,22329	3,80891	186,63972
18,76735	141,29925	12,10000	176,30481	40,49796	147,67666	29,13878	172,47162	5,18571	187,21538	17,28571	166,99265	3,95102	179,92651
19,39879	136,69984	12,50712	170,56595	41,86055	142,86966	30,11918	166,85752	5,36019	181,12136	17,86731	161,55691	4,08396	174,06976
19,98904	132,66330	12,88767	165,52938	43,13425	138,65093	31,03562	161,93046	5,52329	175,77311	18,41096	156,78636	4,20822	168,92973
20,54054	129,10138	13,24324	161,08503	44,32432	134,92825	31,89189	157,58274	5,67568	171,05373	18,91892	152,57676	4,32432	164,39408
21,05574	125,94249	13,57541	157,14356	45,43607	131,62679	32,69180	153,72696	5,81803	166,86834	19,39344	148,84347	4,43279	160,37164
21,53703	123,12805	13,88571	153,63187	46,47464	128,68532	33,43907	150,29162	5,95102	163,13933	19,83673	145,51726	4,53411	156,78782
21,98672	120,60974	14,17565	150,48967	47,44502	126,05335	34,13727	147,21774	6,07528	159,80267	20,25092	142,54103	4,62878	153,58107
22,40701	118,34742	14,44663	147,66689	48,35197	123,68892	34,78983	144,45633	6,19141	156,80520	20,63804	139,86734	4,71727	150,70030
22,80000	116,30755	14,70000	145,12165	49,20000	121,55698	35,40000	141,96643	6,30000	154,10246	21,00000	137,45654	4,80000	148,10278
23,16764	114,46188	14,93703	142,81873	49,99334	119,62800	35,97082	139,71358	6,40159	151,65702	21,33862	135,27526	4,87740	145,75255
23,51178	112,78652	15,15891	140,72832	50,73595	117,87703	36,50514	137,66862	6,49668	149,43724	21,65559	133,29526	4,94985	143,61920
23,83413	111,26115	15,36674	138,82505	51,43153	116,28281	37,00562	135,80673	6,58575	147,41619	21,95248	131,49252	5,01771	141,67683
24,13626	109,86838	15,56154	137,08723	52,08352	114,82718	37,47473	134,10670	6,66923	145,57083	22,23077	129,84649	5,08132	139,90331
24,41967	108,59327	15,74426	135,49623	52,69508	113,49453	37,91475	132,55029	6,74754	143,88137	22,49180	128,33952	5,14098	138,27963
24,68571	107,42294	15,91579	134,03597	53,26917	112,27138	38,32782	131,12177	6,82105	142,33074	22,73684	126,95639	5,19699	136,78937
24,93565	106,34622	16,07693	132,69249	53,80851	111,14605	38,71588	129,80751	6,89011	140,90413	22,96705	125,68387	5,24961	135,41830
25,17064	105,35337	16,22844	131,45368	54,31560	110,10840	39,08073	128,59563	6,95505	139,58865	23,18349	124,51049	5,29908	134,15404
25,39176	104,43592	16,37100	130,30894	54,79275	109,14953	39,42405	127,47578	7,01614	138,37306	23,38715	123,42621	5,34563	132,98578
25,60000	103,58641	16,50526	129,24897	55,24211	108,26168	39,74737	126,43885	7,07368	137,24750	23,57895	122,42223	5,38947	131,90403
25,79626	102,79830	16,63180	128,26561	55,66562	107,43800	40,05209	125,47687	7,12792	136,20329	23,75972	121,49081	5,43079	130,90048
25,98140	102,06581	16,75116	127,35165	56,06512	106,67245	40,33953	124,58279	7,17907	135,23277	23,93023	120,62513	5,46977	129,96774
26,15617	101,38382	16,86384	126,50071	56,44225	105,95969	40,61089	123,75035	7,22736	134,32917	24,09121	119,81913	5,50656	129,09932
26,32129	100,74781	16,97030	125,70713	56,79857	105,29496	40,86726	122,97402	7,27299	133,48648	24,24329	119,06747	5,54132	128,28944
26,47742	100,15372	17,07097	124,96587	57,13548	104,67406	41,10968	122,24887	7,31613	132,69934	24,38710	118,36535	5,57419	127,53295
26,62517	99,59796	17,16623	124,27241	57,45430	104,09322	41,33907	121,57050	7,35695	131,96297	24,52318	117,70853	5,60530	126,82525
26,76509	99,07729	17,25644	123,62275	57,75624	103,54905	41,55632	120,93496	7,39562	131,27311	24,65205	117,09318	5,63475	126,16224
26,89770	98,58882	17,34194	123,01327	58,04240	103,03853	41,76221	120,33873	7,43226	130,62591	24,77419	116,51589	5,66267	125,54024
27,02347	98,12995	17,42303	122,44073	58,31381	102,55895	41,95750	119,77863	7,46701	130,01793	24,89004	115,97359	5,68915	124,95593
27,14286	97,69834	17,50000	121,90219	58,57143	102,10786	42,14286	119,25180	7,50000	129,44606	25,00000	115,46349	5,71429	124,40633
27,25626	97,29187	17,57311	121,39501	58,81613	101,68304	42,31892	118,75566	7,53133	128,90750	25,10445	114,98311	5,73816	123,88874
27,36405	96,90862	17,64261	120,91682	59,04874	101,28250	42,48628	118,28786	7,56112	128,39972	25,20373	114,53017	5,76085	123,40072
27,46658	96,54686	17,70872	120,46544	59,26999	100,90441	42,64548	117,84629	7,58945	127,92040	25,29817	114,10263	5,78244	122,94007
27,56418	96,20501	17,77164	120,03890	59,48060	100,54713	42,79701	117,42902	7,61642	127,46746	25,38806	113,69862	5,80299	122,50477
27,65714	95,88164	17,83158	119,63541	59,68120	100,20916	42,94135	117,03431	7,64211	127,03901	25,47368	113,31644	5,82256	122,09299
27,74575	95,57543	17,88871	119,25335	59,87241	99,88914	43,07893	116,66055	7,66659	126,63330	25,55530	112,95456	5,84121	121,70308
27,83026	95,28520	17,94320	118,89121	60,05478	99,58581	43,21014	116,30629	7,68994	126,24876	25,63314	112,61155	5,85900	121,33351
27,91092	95,00985	17,99520	118,54765	60,22882	99,29803	43,33537	115,97020	7,71223	125,88393	25,70742	112,28614	5,87598	120,98289
27,98794	94,74838	18,04486	118,22141	60,39503	99,02476	43,45496	115,65105	7,73351	125,53750	25,77837	111,97713	5,89220	120,64994
28,06154	94,49988	18,09231	117,91134	60,55385	98,76504	43,56923	115,34773	7,75385	125,20824	25,84615	111,68344	5,90769	120,33351
28,13191	94,26350	18,13768	117,61640	60,70570	98,51799	43,67849	115,05920	7,77329	124,89505	25,91097	111,40407	5,92251	120,03250
28,19923	94,03846	18,18108	117,33561	60,85097	98,28280	43,78301	114,78451	7,79189	124,59689	25,97297	111,13812	5,93668	119,74595
28,26367	93,82406	18,22263	117,06809	60,99002	98,05872	43,88306	114,52281	7,80970	124,31281	26,03233	110,88472	5,95025	119,47293
28,32539	93,61962	18,26242	116,81301	61,12320	97,84506	43,97889	114,27327	7,82675	124,04194	26,08917	110,64312	5,96324	119,21261
28,38453	93,42455	18,30055	116,56961	61,25083	97,64118	44,07072	114,03517	7,84309	123,78348	26,14365	110,41257	5,97569	118,96421
28,44124	93,23828	18,33711	116,33719	61,37320	97,44650	44,15876	113,80780	7,85876	123,53668	26,19588	110,19243	5,98763	118,72702
28,49564	93,06029	18,37219	116,11510	61,49058	97,26048	44,24322	113,59054	7,87379	123,30084	26,24598	109,98207	5,99908	118,50037
28,54785	92,89009	18,40585	115,90274	61,60325	97,08260	44,32429	113,38279	7,88822	123,07534	26,29407	109,78092	6,01007	118,28364
28,59798	92,72724	18,43817	115,69954	61,71144	96,91239	44,40213	113,18401	7,90207	122,85957	26,34025	109,58846	6,02063	118,07627
28,64615	92,57131	18,46923	115,50499	61,81538	96,74943	44,47692	112,99369	7,91538	122,65297	26,38462	109,40418	6,03077	117,87772

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DOY	n2ref	DOY	n2ref	DOY	n2ref	DOY	n2ref	DOY	n2ref	DOY	n2ref	DOY	n2ref
230,75725	15,80000	250,67274	12,90000	275,92640	6,10000	313,74597	24,90000	320,96133	10,40000	330,88206	19,70000	358,55183	9,10000
n1	u1	n1	u1	n1	u1	n1	u1	n1	u1	n1	u1	n1	u1
3,90000	424,83993	3,50000	386,12920	4,00000	455,83257	12,40000	354,76760	6,80000	437,46098	7,40000	394,42400	5,50000	481,49588
n2	u2	n2	u2	n2	u2	n2	u2	n2	u2	n2	u2	n2	u2
4,77293	347,14000	4,28340	315,50916	4,89532	372,46432	15,17548	289,88336	8,32204	357,45276	9,05633	322,28691	6,73106	393,43401
5,05946	327,48078	4,54054	297,64126	5,18919	351,37094	16,08649	273,46669	8,82162	337,20951	9,60000	304,03516	7,13514	371,15307
5,62132	294,74842	5,04478	267,89141	5,76546	316,25070	17,87292	246,13314	9,80128	303,50473	10,66610	273,64624	7,92751	334,05557
6,16452	268,77629	5,53226	244,28582	6,32258	288,38387	19,60000	224,44481	10,74839	276,76103	11,69677	249,53355	8,69355	304,61984
6,68571	247,82330	6,00000	225,24203	6,85714	265,90233	21,25714	206,94777	11,65714	255,18557	12,68571	230,08067	9,42857	280,87260
7,18273	230,67481	6,44604	209,65609	7,36691	247,50284	22,83741	192,62772	12,52374	237,52764	13,62878	214,15991	10,12950	261,43721
7,65433	216,46256	6,86927	196,73884	7,85059	232,25379	24,33684	180,75962	13,34601	222,89318	14,52360	200,96517	10,79457	245,32965
8,10000	204,55256	7,26923	185,91406	8,30769	219,47494	25,75385	170,81403	14,12308	210,62936	15,36923	189,90785	11,42308	231,83135
8,51982	194,47313	7,64599	176,75305	8,73828	208,66020	27,08865	162,39708	14,85507	200,25049	16,16581	180,55004	12,01513	220,40774
8,91429	185,86747	8,00000	168,93153	9,14286	199,42675	28,34286	155,21082	15,54286	191,38918	16,91429	172,56050	12,57143	210,65445
9,28421	178,46167	8,33198	162,20053	9,52227	191,48069	29,51903	149,02653	16,18785	183,76337	17,61619	165,68491	13,09312	202,26102
9,63061	172,04262	8,64286	156,36637	9,87755	184,59335	30,62041	143,66622	16,79184	177,15362	18,27347	159,72542	13,58163	194,98593
9,95464	166,44249	8,93366	151,27652	10,20989	178,58469	31,65066	138,98976	17,35682	171,38712	18,88830	154,52623	14,03860	188,63898
10,25753	161,52768	9,20548	146,80954	10,52055	173,31134	32,61370	134,88560	17,88493	166,32631	19,46301	149,96329	14,46575	183,06875
10,54054	157,19078	9,45946	142,86780	10,81081	168,65805	33,51351	131,26401	18,37838	161,86056	20,00000	145,93688	14,86486	178,15347
10,80492	153,34459	9,69672	139,37208	11,08197	164,53128	34,35410	128,05221	18,83934	157,90012	20,50164	142,36606	15,23770	173,79437
11,05190	149,91780	9,91837	136,25753	11,33528	160,85450	35,13936	125,19062	19,26997	154,37152	20,97026	139,18460	15,58601	169,91058
11,28266	146,85156	10,12546	133,47068	11,57196	157,56457	35,87306	122,63013	19,67232	151,21419	21,40812	136,33789	15,91144	166,43544
11,49833	144,09702	10,31902	130,96713	11,79316	154,60908	36,55881	120,32991	20,04838	148,37782	21,81735	133,78055	16,21560	163,31355
11,70000	141,61331	10,50000	128,70973	12,00000	151,94419	37,20000	118,25587	20,40000	145,82033	22,20000	131,47467	16,50000	160,49863
11,88866	139,36607	10,66931	126,66725	12,19350	149,53300	37,79984	116,37928	20,72895	143,50632	22,55797	129,38831	16,76606	157,95169
12,06526	137,32619	10,82779	124,81325	12,37462	147,34432	38,36133	114,67586	21,03686	141,40584	22,89305	127,49448	17,01511	155,63978
12,23067	135,46893	10,97624	123,12522	12,54428	145,35157	38,88726	113,12493	21,32527	139,49341	23,20691	125,77019	17,24838	153,53484
12,38571	133,77313	11,11538	121,58394	12,70330	143,53205	39,38022	111,70883	21,59560	137,74723	23,50110	124,19579	17,46703	151,61289
12,53115	132,22059	11,24590	120,17286	12,85246	141,86626	39,84262	110,41237	21,84918	136,14857	23,77705	122,75441	17,67213	149,85331
12,66767	130,79563	11,36842	118,87774	12,99248	140,33734	40,27669	109,22243	22,08722	134,68127	24,03609	121,43146	17,86466	148,23831
12,79593	129,48463	11,48352	117,68620	13,12403	138,93071	40,68448	108,12767	22,31084	133,33133	24,27945	120,21433	18,04554	146,75249
12,91651	128,27577	11,59174	116,58749	13,24771	137,63366	41,06789	107,11820	22,52110	132,08656	24,50826	119,09201	18,21560	145,38241
13,02998	127,15870	11,69357	115,57220	13,36409	136,43509	41,42867	106,18537	22,71895	130,93630	24,72356	118,05491	18,37562	144,11637
13,13684	126,12436	11,78947	114,63211	13,47368	135,32529	41,76842	105,32163	22,90526	129,87123	24,92632	117,09462	18,52632	142,94409
13,23756	125,16477	11,87986	113,75996	13,57698	134,29570	42,08864	104,52032	23,08087	128,88314	25,11742	116,20374	18,66835	141,85653
13,33256	124,27291	11,96512	112,94936	13,67442	133,33878	42,39070	103,77556	23,24651	127,96478	25,29767	115,37573	18,80233	140,84573
13,42224	123,44254	12,04560	112,19465	13,76640	132,44784	42,67585	103,08215	23,40289	127,10974	25,46785	114,60481	18,92880	139,90463
13,50698	122,66814	12,12165	111,49082	13,85331	131,61694	42,94526	102,43548	23,55063	126,31234	25,62862	113,88585	19,04830	139,02696
13,58710	121,94480	12,19355	110,83338	13,93548	130,84083	43,20000	101,83144	23,69032	125,56750	25,78065	113,21430	19,16129	138,20715
13,66291	121,26811	12,26159	110,21835	14,01325	130,11478	43,44106	101,26637	23,82252	124,87071	25,92450	112,58606	19,26821	137,44022
13,73472	120,63416	12,32603	109,64216	14,08689	129,43458	43,66935	100,73697	23,94771	124,21793	26,06074	111,99749	19,36947	136,72172
13,80276	120,03941	12,38710	109,10161	14,15668	128,79644	43,88571	100,24032	24,06636	123,60551	26,18986	111,44532	19,46544	136,04766
13,86731	119,48070	12,44502	108,59381	14,22288	128,19698	44,09093	99,77377	24,17890	123,03021	26,31233	110,92662	19,55646	135,41445
13,92857	118,95518	12,50000	108,11618	14,28571	127,63312	44,28571	99,33493	24,28571	122,48907	26,42857	110,43872	19,64286	134,81885
13,98676	118,46027	12,55222	107,66636	14,34540	127,10210	44,47073	98,92165	24,38718	121,97946	26,53899	109,97924	19,72492	134,25793
14,04208	117,99364	12,60186	107,24224	14,40213	126,60143	44,64660	98,53198	24,48362	121,49896	26,64394	109,54601	19,80293	133,72907
14,09469	117,55316	12,64908	106,84191	14,45610	126,12882	44,81390	98,16416	24,57536	121,04541	26,74378	109,13708	19,87713	133,22986
14,14478	117,13694	12,69403	106,46361	14,50746	125,68223	44,97313	97,81658	24,66269	120,61681	26,83881	108,75065	19,94776	132,75812
14,19248	116,74321	12,73684	106,10575	14,55639	125,25978	45,12481	97,48779	24,74586	120,21139	26,92932	108,38511	20,01504	132,31188
14,23795	116,37038	12,77765	105,76690	14,60303	124,85975	45,26938	97,17646	24,82515	119,82748	27,01560	108,03897	20,07916	131,88934
14,28132	116,01700	12,81657	105,44572	14,64751	124,48059	45,40727	96,88136	24,90076	119,46361	27,09789	107,71089	20,14032	131,48883
14,32271	115,68174	12,85371	105,14101	14,68996	124,12088	45,53886	96,60140	24,97293	119,11839	27,17642	107,39964	20,19869	131,10887
14,36223	115,36339	12,88918	104,85166	14,73049	123,77930	45,66453	96,33556	25,04184	118,79058	27,25141	107,10407	20,25443	130,74805
14,40000	115,06082	12,92308	104,57666	14,76923	123,45465	45,78462	96,08289	25,10769	118,47902	27,32308	106,82317	20,30769	130,40513
14,43611	114,77300	12,95548	104,31507	14,80627	123,14584	45,89943	95,84255	25,17065	118,18265	27,39159	106,55596	20,35862	130,07894
14,47066	114,49900	12,98649	104,06604	14,84170	122,85186	46,00927	95,61374	25,23089	117,90051	27,45714	106,30158	20,40734	129,76840
14,50372	114,23795	13,01616	103,82877	14,87561	122,57176	46,11441	95,39575	25,28855	117,63170	27,51989	106,05921	20,45397	129,47253
14,53540	113,98904	13,04459	103,60254	14,90810	122,30469	46,21510	95,18789	25,34377	117,37540	27,57998	105,82812	20,49864	129,19042
14,56575	113,75152	13,07182	103,38666	14,93923	122,04984	46,31160	94,98955	25,39669	117,13082	27,63757	105,60761	20,54144	128,92123
14,59485	113,52472	13,09794	103,18053	14,96907	121,80650	46,40412	94,80016	25,44742	116,89729	27,69278	105,39705	20,58247	128,66419
14,62276	113,30800	13,12299	102,98356	14,99770	121,57397	46,49288	94,61918	25,49610	116,67413	27,74575	105,19584	20,62184	128,41857
14,64955	113,10077	13,14703	102,79521	15,02518	121,35162	46,57807	94,44613	25,54281	116,46074	27,79659	105,00345	20,65963	128,18370
14,67528	112,90248	13,17012	102,61499	15,05157	121,13887	46,65987	94,28055	25,58767	116,25657	27,84541	104,81936	20,69591	127,95897
14,70000	112,71264	13,19231	102,44244	15,07692	120,93517	46,73846	94,12202	25,63077	116,06108	27,89231	104,64310	20,73077	127,74380

EK Tablo 2 Devamı

2004								DOY	n2ref	DOY	n2ref	DOY	n2ref	DOY	n2ref	DOY	n2ref
								22,04482	17,70000	100,07569	9,10000	101,81013	9,60000	103,73320	9,40000	115,33896	8,20000
								n1	u1	n2	u2	n3	u3	n4	u4	n5	u5
			Re1=1e13	Re1=1e13	Re1=1e13	Re1=1e13	Re1=1e13	6,10000	475,66190	4,50000	454,05597	4,00000	443,31280	3,30000	418,01706	5,00000	433,63557
step	Mach	Re2/Re1	M2/M1	Kappa	U2/U1	S2-S1	C:s2^2/Cs1^2	n2	u2	n3	u3	n4	u4	n5	u5	n6	u6
1,00000	1,15000	1,77820	0,76312	1,22383	0,81711	0,02571	1,14650	7,46536	388,66702	5,50723	371,01265	4,89532	362,23433	4,03864	341,56498	6,11914	354,32699
2,00000	1,20000	1,70411	0,70520	1,29730	0,77083	0,05550	1,19479	7,91351	366,65605	5,83784	350,00147	5,18919	341,72028	4,28108	322,22148	6,48649	334,26075
3,00000	1,30000	1,57303	0,61033	1,44136	0,69379	0,15718	1,29218	8,79232	330,00803	6,48614	315,01812	5,76546	307,56465	4,75650	290,01479	7,20682	300,85072
4,00000	1,40000	1,46067	0,53626	1,58065	0,63265	0,31681	1,39184	9,64194	300,92896	7,11290	287,25990	6,32258	280,46320	5,21613	264,45977	7,90323	274,34087
5,00000	1,50000	1,36329	0,47712	1,71429	0,58333	0,53199	1,49479	10,45714	277,46944	7,71429	264,86598	6,85714	258,59913	5,65714	243,84328	8,57143	252,95408
6,00000	1,60000	1,27808	0,42902	1,84173	0,54297	0,79777	1,60176	11,23453	258,26955	8,28777	246,53820	7,36691	240,70500	6,07770	226,97020	9,20863	235,45056
7,00000	1,70000	1,20290	0,38927	1,96265	0,50952	1,10824	1,71325	11,97216	242,35714	8,83192	231,34858	7,85059	225,87478	6,47674	212,98620	9,81324	220,94408
8,00000	1,80000	1,13608	0,35596	2,07692	0,48148	1,45739	1,82963	12,66923	229,02239	9,34615	218,61954	8,30769	213,44690	6,85385	201,26747	10,38462	208,78750
9,00000	1,90000	1,07628	0,32771	2,18457	0,45776	1,83948	1,95119	13,32587	217,73720	9,83056	207,84695	8,73028	202,92920	7,20908	191,34991	10,92284	198,49939
10,00000	2,00000	1,02247	0,30349	2,28571	0,43750	2,24924	2,07812	13,94286	208,10208	10,28571	198,64948	9,14286	193,94935	7,54286	182,88246	11,42857	189,71556
11,00000	2,10000	0,97378	0,28253	2,38057	0,42007	2,68195	2,21061	14,52146	199,81035	10,71255	190,73439	9,52227	186,22153	7,85387	175,59560	11,90283	182,15644
12,00000	2,20000	0,92952	0,26424	2,46939	0,40496	3,13341	2,34876	15,06327	192,62341	11,11224	183,87390	9,87755	179,52337	8,14898	169,27963	12,34694	175,60449
13,00000	2,30000	0,88910	0,24815	2,55247	0,39178	3,59997	2,49268	15,57008	186,35336	11,48613	177,88866	10,20989	173,67973	8,42316	163,76944	12,76236	169,88842
14,00000	2,40000	0,85206	0,23389	2,63014	0,38021	4,07845	2,64245	16,04384	180,85062	11,83562	172,63586	10,52055	168,55122	8,67945	158,93357	13,15068	164,87186
15,00000	2,50000	0,81797	0,22119	2,70270	0,37000	4,56609	2,79812	16,48649	175,99490	12,16216	168,00071	10,81081	164,02574	8,91892	154,66631	13,51351	160,44516
16,00000	2,60000	0,78651	0,20980	2,77049	0,36095	5,06053	2,95976	16,90000	171,68861	12,46721	163,89002	11,08197	160,01231	9,14262	150,88190	13,85246	156,51935
17,00000	2,70000	0,75738	0,19954	2,83382	0,35288	5,55974	3,12740	17,28630	167,85188	12,75219	160,22757	11,33528	156,43651	9,35160	147,51013	14,16910	153,02161
18,00000	2,80000	0,73033	0,19025	2,89299	0,34566	6,06199	3,30108	17,64723	164,41884	13,01845	156,95047	11,57196	153,23695	9,54686	144,49314	14,46494	149,89189
19,00000	2,90000	0,70515	0,18180	2,94829	0,33918	6,56580	3,48083	17,98457	161,33479	13,26731	154,00650	11,79316	150,36264	9,72936	141,78284	14,74145	147,08032
20,00000	3,00000	0,68165	0,17408	3,00000	0,33333	7,06992	3,66667	18,30000	158,55397	13,50000	151,35199	12,00000	147,77093	9,90000	139,33902	15,00000	144,54519
21,00000	3,10000	0,65966	0,16700	3,04837	0,32804	7,57329	3,85861	18,59508	156,03789	13,71768	148,95020	12,19350	145,42597	10,05964	137,12786	15,24187	142,25142
22,00000	3,20000	0,63904	0,16049	3,09366	0,32324	8,07502	4,05669	18,87130	153,75399	13,92145	146,77004	12,37462	143,29740	10,20906	135,12075	15,46828	140,16931
23,00000	3,30000	0,61968	0,15448	3,13607	0,31887	8,57435	4,26091	19,13002	151,67456	14,11231	144,78506	12,54428	141,35939	10,34903	133,29332	15,68035	138,27360
24,00000	3,40000	0,60145	0,14891	3,17582	0,31488	9,07066	4,47128	19,37253	149,77589	14,29121	142,97264	12,70330	139,58984	10,48022	131,62475	15,87912	136,54269
25,00000	3,50000	0,58427	0,14374	3,21311	0,31122	9,56342	4,68782	19,60000	148,03763	14,45902	141,31334	12,85246	137,96980	10,60328	130,09715	16,06557	134,95801
26,00000	3,60000	0,56804	0,13893	3,24812	0,30787	10,05221	4,91053	19,81353	146,44220	14,61654	139,79038	12,99248	136,48288	10,71880	128,69507	16,24060	133,50354
27,00000	3,70000	0,55269	0,13444	3,28101	0,30478	10,53666	5,13943	20,01414	144,97438	14,76453	138,38923	13,12403	135,11488	10,82732	127,40513	16,40503	132,16541
28,00000	3,80000	0,53814	0,13024	3,31193	0,30194	11,01648	5,37452	20,20275	143,62091	14,90367	137,09723	13,24771	133,85345	10,92936	126,21568	16,55963	130,93152
29,00000	3,90000	0,52434	0,12630	3,34102	0,29931	11,49146	5,61580	20,38023	142,37020	15,03460	135,90334	13,36409	132,68781	11,02537	125,11655	16,70511	129,79132
30,00000	4,00000	0,51123	0,12260	3,36842	0,29687	11,96141	5,86328	20,54737	141,21213	15,15789	134,79786	13,47368	131,60849	11,11579	124,09881	16,84211	128,73556
31,00000	4,10000	0,49876	0,11912	3,39425	0,29462	12,42618	6,11697	20,70490	140,13775	15,27410	133,77229	13,57698	130,60718	11,20101	123,15464	16,97123	127,75611
32,00000	4,20000	0,48689	0,11584	3,41860	0,29252	12,88568	6,37687	20,85349	139,13919	15,38372	132,81909	13,67442	129,67653	11,28140	122,27710	17,09302	126,84578
33,00000	4,30000	0,47557	0,11273	3,44160	0,29056	13,33983	6,64298	20,99376	138,20949	15,48720	131,93162	13,76640	128,81006	11,35728	121,46007	17,20800	125,99822
34,00000	4,40000	0,46476	0,10980	3,46333	0,28874	13,78858	6,91532	21,12630	137,34246	15,58497	131,10397	13,85331	128,00199	11,42898	120,69811	17,31664	125,20779
35,00000	4,50000	0,45443	0,10702	3,48387	0,28704	14,23192	7,19387	21,25161	136,53258	15,67742	130,33088	13,93548	127,24719	11,49677	119,98638	17,41935	124,46947
36,00000	4,60000	0,44455	0,10438	3,50331	0,28544	14,66983	7,47864	21,37020	135,77495	15,76490	129,60766	14,01325	126,54108	11,56093	119,32056	17,51656	123,77877
37,00000	4,70000	0,43509	0,10187	3,52172	0,28395	15,10233	7,76964	21,48250	135,06515	15,84775	128,93011	14,08689	125,87956	11,62168	118,69679	17,60861	123,13169
38,00000	4,80000	0,42603	0,09948	3,53917	0,28255	15,52944	8,06686	21,58894	134,39926	15,92627	128,29446	14,15668	125,25896	11,67926	118,11159	17,69585	122,52463
39,00000	4,90000	0,41733	0,09721	3,55572	0,28124	15,95120	8,37032	21,68989	133,77372	16,00074	127,69733	14,22288	124,67596	11,73388	117,56186	17,77860	121,95436
40,00000	5,00000	0,40899	0,09504	3,57143	0,28000	16,36765	8,68000	21,78571	133,18533	16,07143	127,13567	14,28571	124,12758	11,78571	117,04478	17,85714	121,41796
41,00000	5,10000	0,40097	0,09297	3,58635	0,27884	16,77884	8,99592	21,87673	132,63122	16,13857	126,60672	14,34540	123,61115	11,83495	116,55781	17,93175	120,91280
42,00000	5,20000	0,39326	0,09099	3,60053	0,27774	17,18483	9,31807	21,96325	132,10876	16,20240	126,10800	14,40213	123,12423	11,88176	116,09867	18,00266	120,43651
43,00000	5,30000	0,38584	0,08909	3,61402	0,27670	17,58569	9,64645	22,04555	131,61560	16,26311	125,63724	14,45610	122,66460	11,92628	115,66528	18,07012	119,98692
44,00000	5,40000	0,37869	0,08727	3,62687	0,27572	17,98149	9,98107	22,12388	131,14958	16,32090	125,19239	14,50746	122,23028	11,96866	115,25573	18,13433	119,56207
45,00000	5,50000	0,37181	0,08553	3,63910	0,27479	18,37230	10,32193	22,19850	130,70874	16,37594	124,77158	14,55639	121,81943	12,00902	114,88832	18,19549	119,16019
46,00000	5,60000	0,36517	0,08386	3,65076	0,27392	18,75819	10,66902	22,26962	130,29132	16,42841	124,37311	14,60303	121,43039	12,04750	114,50148	18,25378	118,77964
47,00000	5,70000	0,35876	0,08225	3,66188	0,27308	19,13925	11,02235	22,33745	129,89567	16,47844	123,99543	14,64751	121,06164	12,08419	114,13378	18,30938	118,41895
48,00000	5,80000	0,35258	0,08071	3,67249	0,27229	19,51555	11,38193	22,40218	129,52030	16,52620	123,63712	14,68996	120,71181	12,11921	113,82391	18,36245	118,07675
49,00000	5,90000	0,34660	0,07923	3,68262	0,27155	19,88717	11,74774	22,46400	129,16386	16,57181	123,29687	14,73049	120,37961	12,15266	113,51066	18,41312	117,75180
50,00000	6,00000	0,34082	0,07780	3,69231	0,27083	20,25419	12,11979	22,52308	128,82510	16,61538	122,97349	14,76923	120,06388	12,18462	113,21295	18,46154	117,44297
51,00000	6,10000	0,33524	0,07642	3,70157	0,27016	20,61669	12,49809	22,57956	128,50285	16,65705	122,66589	14,80627	119,76356	12,21517	112,92976	18,50783	117,14920
52,00000	6,20000	0,32983	0,07509	3,71042	0,26951	20,97476	12,88262	22,63359	128,19608	16,69691	122,37304	14,84170	119,47764	12,24440	112,66016	18,55212	116,86952
53,00000	6,30000	0,32459	0,07381	3,71890	0,26890	21,32847	13,27340	22,68531	127,90379	16,73507	122,09404	14,87561	119,20524	12,27238	112,40330	18,59452	116,60307
54,00000	6,40000	0,31952	0,07257	3,72702	0,26831	21,67791	13,67042	22,73485	127,62510	16,77161	121,82800	14,90810	118,94550	12,29918	112,15839	18,63512	116,34900
55,00000	6,50000	0,31461	0,07137	3,73481	0,26775	22,02315	14,07369	22,78232	127,35918	16,80663	121,57416	14,93923	118,69766	12,32486	111,92469	18,67403	116,10657
56,00000	6,60000	0,30984	0,07022	3,74227	0,26722	22,36427	14,48320	22,82784	127,10525	16,84021	121,33176	14,96907	118,46100	12,34948	111,70153	18,71134	115,87507
57,00000	6,70000	0,30521	0,06910	3,74943	0,26671	22,70136	14,89895	22,87150	126,86260	16,87242	121,10013	14,99770	118,23485	12,37311	111,48829	18,74713	115,65386
58,00000	6,80000	0,30073	0,06801	3,75630	0,26622	23,03447	15,32095	22,91340	126,63058	16,90333	120,87865	15,02518	118,01861	12,39578	111,28439	18,78148	115,44234
59,00000	6,90000	0,29637	0,06697	3,76289	0,26575	23,36370	15,74919	22,95365	126,40857	16,93302	120,66673	15,05157	117,81170	12,41755	111,08928	18,81446	115,23895
60,00000	7,00000	0,29213	0,06595	3,76923	0,26531	23,68912	16,18367	22,98231	126,19601	16,96154	120,46383	15,07692	117,61360	12,43846	110,90248	18,84615	115,04617

EK Tablo 2 Devamı

DOY	n2ref	DOY	n2ref	DOY	n2ref	DOY	n2ref	DOY	n2ref	DOY	n2ref	DOY	n2ref
149,46388	11,40000	198,87969	15,00000	204,41278	12,10000	208,93592	4,90000	212,85550	5,70000	312,41631	60,70000	312,74587	35,50000
n1	u1	n1	u1	n1	u1	n1	u1	n1	u1	n1	u1	n1	u1
7,60000	368,75169	7,60000	391,51600	3,50000	380,09263	2,10000	605,21186	2,60000	433,79458	21,40000	351,18956	17,00000	483,88359
n2	u2	n2	u2	n2	u2	n2	u2	n2	u2	n2	u2	n2	u2
9,30110	301,30987	9,30110	319,91076	4,28340	310,57664	2,57004	494,52330	3,18195	354,45692	26,18994	286,95971	20,80509	395,38503
9,85946	284,24610	9,85946	301,79359	4,54054	292,98807	2,72432	466,51747	3,37297	334,38332	27,76216	270,70862	22,05405	372,99360
10,95437	255,83512	10,95437	271,62871	5,04478	263,70332	3,02687	419,88811	3,74755	300,96103	30,84520	243,65075	24,50320	335,71214
12,01290	233,29189	12,01290	247,69380	5,53226	240,46677	3,31935	382,88913	4,10968	274,44147	33,82581	222,18115	26,87097	306,13044
13,02857	215,10515	13,02857	228,38433	6,00000	221,72070	3,60000	353,04025	4,45714	253,04684	36,68571	204,86058	29,14286	282,26543
13,99712	200,22065	13,99712	212,58095	6,44604	206,37842	3,86763	328,61112	4,78849	235,53690	39,41295	190,68496	31,30935	262,73367
14,91613	187,88473	14,91613	199,48350	6,86927	193,66312	4,12156	308,36486	5,10289	221,02509	42,00068	178,93655	33,36503	246,54622
15,78462	177,54711	15,78462	188,50770	7,26923	183,00756	4,36154	291,39830	5,40000	208,86406	44,44615	169,09127	35,30769	232,98099
16,60272	168,79839	16,60272	179,21889	7,64599	173,98977	4,58759	277,03950	5,67988	198,57217	46,74977	160,75921	37,13767	221,50073
17,37143	161,32887	17,37143	171,28825	8,00000	166,29053	4,80000	264,78019	5,94286	189,78513	48,91429	153,64543	38,85714	211,69907
18,09231	154,90080	18,09231	164,46335	8,33198	159,66476	4,99919	254,23015	6,18947	182,22323	50,94413	147,52351	40,46964	203,26403
18,76735	149,32920	18,76735	158,54780	8,64286	153,92181	5,18571	245,08579	6,42041	175,66888	52,84490	142,21726	41,97959	195,95286
19,39879	144,46841	19,39879	153,38694	8,93366	148,91153	5,36019	237,10805	6,63643	169,95071	54,62292	137,58797	43,39204	189,57443
19,98904	140,20247	19,98904	148,85765	9,20548	144,51439	5,52329	230,10659	6,83836	164,93232	56,28493	133,52520	44,71233	183,97657
20,54054	136,43813	20,54054	144,86092	9,45946	140,63427	5,67568	223,92839	7,02703	160,50400	57,83784	129,94014	45,94595	179,03693
21,05574	133,09972	21,05574	141,31643	9,69672	137,19320	5,81803	218,44925	7,20328	156,57674	59,28852	126,76073	47,09836	174,65621
21,53703	130,12534	21,53703	138,15842	9,91837	134,12734	5,95102	213,56756	7,36793	153,07772	60,64373	123,92800	48,17493	170,75316
21,98672	127,46391	21,98672	135,33270	10,12546	131,38406	6,07528	209,19951	7,52177	149,94685	61,90996	121,39333	49,18081	167,26078
22,40701	125,07303	22,40701	132,79422	10,31902	128,91965	6,19141	205,27548	7,66556	147,13425	63,09343	119,11632	50,12095	164,12342
22,80000	122,91723	22,80000	130,50533	10,50000	126,69754	6,30000	201,73729	7,80000	144,59819	64,20000	117,06319	51,00000	161,29453
23,16764	120,96667	23,16764	128,43436	10,66931	124,68700	6,40159	198,53594	7,92577	142,30358	65,23521	115,20553	51,82236	158,73497
23,51178	119,19610	23,51178	126,55449	10,82779	122,86197	6,49668	195,63000	8,04350	140,22071	66,20423	113,51928	52,59215	156,41159
23,83413	117,58404	23,83413	124,84291	10,97624	121,20034	6,58575	192,98422	8,15378	138,32431	67,11188	111,98400	53,31317	154,29621
24,13626	116,11212	24,13626	123,28013	11,11538	119,68315	6,66923	190,56844	8,25714	136,59276	67,96264	110,58218	53,98901	152,36473
24,41967	114,76456	24,41967	121,84937	11,24590	118,29414	6,74754	188,35675	8,35410	135,00750	68,76066	109,29879	54,62295	150,59642
24,68571	113,52772	24,68571	120,53618	11,36842	117,01926	6,82105	186,32680	8,44511	133,55250	69,50977	108,12086	55,21805	148,97342
24,93565	112,38981	24,93565	119,32801	11,48352	115,84635	6,89011	184,45920	8,53062	132,21387	70,21354	107,03714	55,77711	147,48023
25,17064	111,34054	25,17064	118,21397	11,59174	114,76481	6,95505	182,73710	8,61101	130,97953	70,87523	106,03785	56,30275	146,10336
25,39176	110,37095	25,39176	117,18452	11,69357	113,76540	7,01614	181,14576	8,68666	129,83891	71,49786	105,11443	56,79736	144,83104
25,60000	109,47316	25,60000	116,23131	11,78947	112,84000	7,07368	179,67227	8,75789	128,78277	72,08421	104,25940	57,26316	143,65294
25,79626	108,64026	25,79626	115,34700	11,87986	111,98149	7,12792	178,30528	8,82504	127,80295	72,63685	103,46617	57,70217	142,55999
25,98140	107,86614	25,98140	114,52509	11,96512	111,18356	7,17907	177,03476	8,88837	126,89229	73,15814	102,72892	58,11628	141,54418
26,15617	107,14540	26,15617	113,75986	12,04560	110,44065	7,22736	175,85185	8,94816	126,04442	73,65026	102,04251	58,50721	140,59841
26,32129	106,47324	26,32129	113,04620	12,12165	109,74782	7,27299	174,74867	9,00465	125,25370	74,11521	101,40236	58,87657	139,71639
26,47742	105,84539	26,47742	112,37959	12,19355	109,10066	7,31613	173,71822	9,05806	124,51511	74,55484	100,80441	59,22581	138,89251
26,62517	105,25804	26,62517	111,75599	12,26159	108,49525	7,35695	172,75423	9,10861	123,82416	74,97086	100,24504	59,55629	138,12178
26,76509	104,70779	26,76509	111,17176	12,32603	107,92807	7,39562	171,85113	9,15648	123,17685	75,36485	99,72098	59,86927	137,39972
26,89770	104,19156	26,89770	110,62366	12,38710	107,39597	7,43226	171,00387	9,20184	122,56956	75,73825	99,22934	60,16590	136,72232
27,02347	103,70661	27,02347	110,10878	12,44502	106,89611	7,46701	170,20796	9,24487	121,99908	76,09241	98,76749	60,44724	136,08596
27,14286	103,25047	27,14286	109,62448	12,50000	106,42594	7,50000	169,45932	9,28571	121,46248	76,42857	98,33308	60,71429	135,48741
27,25626	102,82090	27,25626	109,16839	12,55222	105,98315	7,53133	168,75429	9,32451	120,95714	76,74788	97,92396	60,96794	134,92371
27,36405	102,41587	27,36405	108,73836	12,60186	105,56567	7,56112	168,08954	9,36138	120,48067	77,05140	97,53823	61,20905	134,39223
27,46658	102,03355	27,46658	108,33244	12,64908	105,17159	7,58945	167,46206	9,39646	120,03091	77,34011	97,17411	61,43840	133,89054
27,56418	101,67228	27,56418	107,94886	12,69403	104,79920	7,61642	166,86911	9,42985	119,60591	77,61493	96,83004	61,65672	133,41646
27,65714	101,33053	27,65714	107,58601	12,73684	104,44694	7,64211	166,30822	9,46165	119,20388	77,87669	96,50457	61,86466	132,96801
27,74575	101,00692	27,74575	107,24243	12,77765	104,11338	7,66659	165,77710	9,49197	118,82320	78,12619	96,19638	62,06286	132,54337
27,83026	100,70020	27,83026	106,91677	12,81657	103,79723	7,68994	165,27369	9,52088	118,46237	78,36416	95,90426	62,25190	132,14088
27,91092	100,40920	27,91092	106,60781	12,85371	103,49728	7,71223	164,79609	9,54847	118,12005	78,59127	95,62712	62,43231	131,75903
27,98794	100,13287	27,98794	106,31442	12,88918	103,21246	7,73351	164,34258	9,57482	117,79498	78,80815	95,36396	62,60460	131,39643
28,06154	99,87025	28,06154	106,03558	12,92308	102,94175	7,75385	163,91154	9,60000	117,48603	79,01538	95,11384	62,76923	131,05181
28,13191	99,62043	28,13191	105,77035	12,95548	102,68426	7,77329	163,50154	9,62407	117,19215	79,21353	94,87592	62,92664	130,72399
28,19923	99,38261	28,19923	105,51784	12,98649	102,43912	7,79189	163,11121	9,64710	116,91238	79,40309	94,64942	63,07722	130,41191
28,26367	99,15602	28,26367	105,27726	13,01616	102,20556	7,80970	162,73932	9,66915	116,64582	79,58454	94,43363	63,22136	130,11458
28,32539	98,93997	28,32539	105,04787	13,04459	101,98286	7,82675	162,38472	9,69026	116,39166	79,75833	94,22786	63,35942	129,83107
28,38453	98,73381	28,38453	104,82899	13,07182	101,77036	7,84309	162,04637	9,71050	116,14914	79,92486	94,03153	63,49171	129,56055
28,44124	98,53695	28,44124	104,61998	13,09794	101,56745	7,85876	161,72328	9,72990	115,91756	80,08454	93,84404	63,61856	129,30223
28,49564	98,34884	28,49564	104,42026	13,12299	101,37356	7,87379	161,41455	9,74851	115,69627	80,23771	93,66489	63,74024	129,05539
28,54785	98,16897	28,54785	104,22928	13,14703	101,18816	7,88822	161,11933	9,76637	115,48467	80,38473	93,49359	63,85703	128,81936
28,59798	97,99687	28,59798	104,04655	13,17012	101,01075	7,90207	160,83686	9,78352	115,28221	80,52590	93,32968	63,96918	128,59351
28,64615	97,83208	28,64615	103,87159	13,19231	100,84090	7,91538	160,56641	9,80000	115,08836	80,66154	93,17274	64,07692	128,37728

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2005								DOY	n2ref	DOY	n2ref	DOY	n2ref
								11,83163	31,90000	17,30274	9,10000	21,69961	15,90000
								n1	u1	n1	u1	n1	u1
			Re1=1e13	Re1=1e13	Re1=1e13	Re1=1e13	Re1=1e13	23,00000	403,76362	4,30000	527,81196	5,90000	598,65993
step	Mach	Re2/Re1	M2/M1	Kappa	U2/U1	S2-S1	Cs2^2/Cs1^2	n2	u2	n2	u2	n2	u2
1,00000	1,15000	1,77820	0,76312	1,22383	0,81711	0,02571	1,14650	28,14806	329,91838	5,26246	431,27924	7,22059	489,16967
2,00000	1,20000	1,70411	0,70520	1,29730	0,77083	0,05550	1,19479	29,83784	311,23446	5,57838	406,85505	7,65405	461,46703
3,00000	1,30000	1,57303	0,61033	1,44136	0,69379	0,15718	1,29218	33,15139	280,12594	6,19787	366,18906	8,50405	415,34247
4,00000	1,40000	1,46067	0,53626	1,58065	0,63265	0,31681	1,39184	36,35484	255,44229	6,79677	333,92185	9,32581	378,74404
5,00000	1,50000	1,36329	0,47712	1,71429	0,58333	0,53199	1,49479	39,42857	235,52878	7,37143	307,89031	10,11429	349,21829
6,00000	1,60000	1,27808	0,42902	1,84173	0,54297	0,79777	1,60176	42,35971	219,23103	7,91942	286,58540	10,86619	325,05363
7,00000	1,70000	1,20290	0,38927	1,96265	0,50952	1,10824	1,71325	45,14092	205,72385	8,43939	268,92841	11,57963	305,02656
8,00000	1,80000	1,13608	0,35596	2,07692	0,48148	1,45739	1,82963	47,76923	194,40471	8,93077	254,13168	12,25385	288,24367
9,00000	1,90000	1,07628	0,32771	2,18457	0,45776	1,83948	1,95119	50,24508	184,82531	9,39365	241,60921	12,88896	274,04031
10,00000	2,00000	1,02247	0,30349	2,28571	0,43750	2,24924	2,07812	52,57143	176,64658	9,82857	230,91773	13,48571	261,91372
11,00000	2,10000	0,97378	0,28253	2,38057	0,42007	2,68195	2,21061	54,75304	169,60819	10,23644	221,71693	14,04534	251,47790
12,00000	2,20000	0,92952	0,26424	2,46939	0,40496	3,13341	2,34876	56,79592	163,50758	10,61837	213,74203	14,56939	242,43253
13,00000	2,30000	0,88910	0,24815	2,55247	0,39178	3,59997	2,49268	58,70688	158,18527	10,97563	206,78455	15,05959	234,54115
14,00000	2,40000	0,85206	0,23389	2,63014	0,38021	4,07845	2,64245	60,49315	153,51429	11,30959	200,67850	15,51781	227,61549
15,00000	2,50000	0,81797	0,22119	2,70270	0,37000	4,56609	2,79812	62,16216	149,39254	11,62162	195,29042	15,94595	221,50417
16,00000	2,60000	0,78651	0,20980	2,77049	0,36095	5,06053	2,95976	63,72131	145,73716	11,91311	190,51201	16,34590	216,08435
17,00000	2,70000	0,75738	0,19954	2,83382	0,35288	5,55974	3,12740	65,17784	142,48037	12,18542	186,25463	16,71953	211,25551
18,00000	2,80000	0,73033	0,19025	2,89299	0,34566	6,06199	3,30108	66,53875	139,56625	12,43985	182,44520	17,06863	206,93475
19,00000	2,90000	0,70515	0,18180	2,94829	0,33918	6,56580	3,48083	67,81069	136,94836	12,67765	179,02302	17,39492	203,05320
20,00000	3,00000	0,68165	0,17408	3,00000	0,33333	7,06992	3,66667	69,00000	134,58787	12,90000	175,93732	17,70000	199,55331
21,00000	3,10000	0,65966	0,16700	3,04837	0,32804	7,57329	3,85861	70,11261	132,45211	13,10801	173,14539	17,98541	196,38662
22,00000	3,20000	0,63904	0,16049	3,09366	0,32324	8,07502	4,05669	71,15408	130,51344	13,30272	170,61109	18,25257	193,51214
23,00000	3,30000	0,61968	0,15448	3,13607	0,31887	8,57435	4,26091	72,12959	128,74832	13,48510	168,30367	18,50281	190,89500
24,00000	3,40000	0,60145	0,14891	3,17582	0,31488	9,07066	4,47128	73,04396	127,13664	13,65604	166,19684	18,73736	188,50538
25,00000	3,50000	0,58427	0,14374	3,21311	0,31122	9,56342	4,68782	73,90164	125,66113	13,81639	164,26801	18,95738	186,31763
26,00000	3,60000	0,56804	0,13893	3,24812	0,30787	10,05221	4,91053	74,70677	124,30685	13,96692	162,49766	19,16391	184,30965
27,00000	3,70000	0,55269	0,13444	3,28101	0,30478	10,53666	5,13943	75,46315	123,06090	14,10833	160,86891	19,35794	182,46228
28,00000	3,80000	0,53814	0,13024	3,31193	0,30194	11,01648	5,37452	76,17431	121,91201	14,24128	159,36704	19,54037	180,75881
29,00000	3,90000	0,52434	0,12630	3,34102	0,29931	11,49146	5,61580	76,84349	120,85035	14,36639	157,97922	19,71203	179,18470
30,00000	4,00000	0,51123	0,12260	3,36842	0,29687	11,96141	5,86328	77,47368	119,86732	14,48421	156,69417	19,87368	177,72717
31,00000	4,10000	0,49876	0,11912	3,39425	0,29462	12,42618	6,11697	78,06764	118,95534	14,59525	155,50201	20,02605	176,37497
32,00000	4,20000	0,48689	0,11584	3,41860	0,29252	12,88568	6,37687	78,62791	118,10773	14,70000	154,39397	20,16977	175,11821
33,00000	4,30000	0,47557	0,11273	3,44160	0,29056	13,33983	6,64298	79,15682	117,31855	14,79888	153,36234	20,30544	173,94811
34,00000	4,40000	0,46476	0,10980	3,46333	0,28874	13,78858	6,91532	79,65653	116,58257	14,89231	152,40025	20,43363	172,85687
35,00000	4,50000	0,45443	0,10702	3,48387	0,28704	14,23192	7,19387	80,12903	115,89511	14,98065	151,50158	20,55484	171,83757
36,00000	4,60000	0,44455	0,10438	3,50331	0,28544	14,66983	7,47864	80,57616	115,25200	15,06424	150,66088	20,66954	170,88402
37,00000	4,70000	0,43509	0,10187	3,52172	0,28395	15,10233	7,76964	80,99960	114,64949	15,14340	149,87327	20,77816	169,99069
38,00000	4,80000	0,42603	0,09948	3,53917	0,28255	15,52944	8,06686	81,40092	114,08425	15,21843	149,13437	20,88111	169,15261
39,00000	4,90000	0,41733	0,09721	3,55572	0,28124	15,95120	8,37032	81,78156	113,55326	15,28960	148,44024	20,97875	168,36531
40,00000	5,00000	0,40899	0,09504	3,57143	0,28000	16,36765	8,68000	82,14286	113,05381	15,35714	147,78735	21,07143	167,62478
41,00000	5,10000	0,40097	0,09297	3,58635	0,27884	16,77884	8,99592	82,48604	112,58345	15,42130	147,17248	21,15946	166,92738
42,00000	5,20000	0,39326	0,09099	3,60053	0,27774	17,18483	9,31807	82,81225	112,13997	15,48229	146,59274	21,24314	166,26982
43,00000	5,30000	0,38584	0,08909	3,61402	0,27670	17,58569	9,64645	83,12255	111,72135	15,54030	146,04551	21,32274	165,64914
44,00000	5,40000	0,37869	0,08727	3,62687	0,27572	17,98149	9,98107	83,41791	111,32577	15,59552	145,52840	21,39851	165,06261
45,00000	5,50000	0,37181	0,08553	3,63910	0,27479	18,37230	10,32193	83,69925	110,95157	15,64812	145,03924	21,47068	164,50779
46,00000	5,60000	0,36517	0,08386	3,65076	0,27392	18,75819	10,66902	83,96740	110,59724	15,69825	144,57604	21,53946	163,98242
47,00000	5,70000	0,35876	0,08225	3,66188	0,27308	19,13925	11,02235	84,22316	110,26139	15,74607	144,13701	21,60507	163,48446
48,00000	5,80000	0,35258	0,08071	3,67249	0,27229	19,51555	11,38193	84,46725	109,94277	15,79170	143,72050	21,66769	163,01204
49,00000	5,90000	0,34660	0,07923	3,68262	0,27155	19,88717	11,74774	84,70034	109,64021	15,83528	143,32498	21,72748	162,56343
50,00000	6,00000	0,34082	0,07780	3,69231	0,27083	20,25419	12,11979	84,92308	109,35265	15,87692	142,94907	21,78462	162,13706
51,00000	6,10000	0,33524	0,07642	3,70157	0,27016	20,61669	12,49809	85,13604	109,07911	15,91674	142,59150	21,83924	161,73150
52,00000	6,20000	0,32983	0,07509	3,71042	0,26951	20,97476	12,88262	85,33977	108,81871	15,95483	142,25109	21,89151	161,34539
53,00000	6,30000	0,32459	0,07381	3,71890	0,26890	21,32847	13,27340	85,53479	108,57060	15,99129	141,92676	21,94153	160,97753
54,00000	6,40000	0,31952	0,07257	3,72702	0,26831	21,67791	13,67042	85,72157	108,33404	16,02621	141,61751	21,98944	160,62677
55,00000	6,50000	0,31461	0,07137	3,73481	0,26775	22,02315	14,07369	85,90055	108,10831	16,05967	141,32243	22,03536	160,29208
56,00000	6,60000	0,30984	0,07022	3,74227	0,26722	22,36427	14,48320	86,07216	107,89276	16,09175	141,04066	22,07938	159,97249
57,00000	6,70000	0,30521	0,06910	3,74943	0,26671	22,70136	14,89895	86,23679	107,68679	16,12253	140,77141	22,12161	159,66710
58,00000	6,80000	0,30073	0,06801	3,75630	0,26622	23,03447	15,32095	86,39480	107,48984	16,15207	140,51395	22,16214	159,37508
59,00000	6,90000	0,29637	0,06697	3,76289	0,26575	23,36370	15,74919	86,54653	107,30139	16,18044	140,26761	22,20107	159,09567
60,00000	7,00000	0,29213	0,06595	3,76923	0,26531	23,68912	16,18367	86,69231	107,12096	16,20769	140,03174	22,23846	158,82814

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DOY	n2ref	DOY	n2ref	DOY	n2ref	DOY	n2ref	DOY	n2ref	DOY	n2ref	DOY	n2ref
126,50255	24,00000	127,76286	33,70000	165,74574	12,70000	167,33955	7,20000	191,11608	17,40000	236,23453	24,30000	243,25932	10,50000
n1	u1	n1	u1	n1	u1	n1	u1	n1	u1	n1	u1	n1	u1
10,90000	355,77028	19,00000	378,31799	7,10000	444,19191	6,20000	464,91497	9,40000	356,00816	9,60000	442,09404	5,40000	455,10115
n2	u2	n2	u2	n2	u2	n2	u2	n2	u2	n2	u2	n2	u2
13,33973	290,70265	23,25275	309,12656	8,68918	362,95265	7,58774	379,88563	11,50399	290,89703	11,74876	361,23847	6,60868	371,86668
14,14054	274,23959	24,64865	291,62012	9,21081	342,39793	8,04324	358,37196	12,19459	274,42296	12,45405	340,78082	7,00541	350,80714
15,71087	246,82879	27,38593	262,47210	10,23369	308,17456	8,93646	322,55195	13,54883	246,99383	13,83710	306,71909	7,78337	315,74326
17,22903	225,07915	30,03226	239,34403	11,22258	281,01937	9,80000	294,12988	14,85806	225,22965	15,17419	279,69215	8,53548	287,92114
18,68571	207,53266	32,57143	220,68549	12,17143	259,11195	10,62857	271,20040	16,11429	207,67143	16,45714	257,88819	9,25714	265,47567
20,07482	193,17214	34,99281	205,41485	13,07626	241,18232	11,41871	252,43430	17,31223	193,30131	17,68058	240,04325	9,94532	247,10570
21,39287	181,27050	37,29032	192,75891	13,93480	226,32269	12,16842	236,88142	18,44890	181,39170	18,84143	225,25380	10,59830	231,88112
22,63846	171,29680	39,46154	182,15311	14,74615	213,87018	12,87692	223,84795	19,52308	171,41134	19,93846	212,86009	11,21538	219,12278
23,81180	162,85606	41,50681	173,17742	15,51044	203,33161	13,54433	212,81773	20,53495	162,96495	20,97186	202,37130	11,79667	208,32539
24,91429	155,64950	43,42857	165,51412	16,22857	194,33396	14,17143	203,40030	21,48571	155,75357	21,94286	193,41614	12,34286	199,10675
25,94818	149,44772	45,23077	158,91929	16,90202	186,59082	14,75951	195,29591	22,37733	149,54765	22,85344	185,70957	12,85506	191,17344
26,91633	144,07226	46,91837	153,20315	17,53265	179,87937	15,31020	188,27135	23,21224	144,16859	23,70612	179,02982	13,33469	184,29716
27,82195	139,38259	48,49698	148,21626	18,12256	174,02414	15,82533	182,14296	23,99324	139,47579	24,50374	173,20225	13,78335	178,29814
28,66849	135,26682	49,97260	143,83965	18,67397	168,88546	16,30685	176,76455	24,72329	135,35727	25,24932	168,08784	14,20274	173,03325
29,45946	131,63500	51,35135	139,97766	19,18919	164,35101	16,75676	172,01854	25,40541	131,72302	25,94595	163,57479	14,59459	168,38743
30,19836	128,41412	52,63934	136,55265	19,67049	160,32962	17,17705	167,80955	26,04262	128,49999	26,59672	159,57240	14,96066	164,26728
30,88863	125,54445	53,84257	133,50110	20,12012	156,74673	17,56968	164,05950	26,63790	125,62839	27,20466	156,00644	15,30262	160,59639
31,53358	122,97672	54,96679	130,77063	20,54022	153,54082	17,93653	160,70403	27,19410	123,05894	27,77269	152,81567	15,62214	157,31175
32,13637	120,67000	56,01753	128,31772	20,93287	150,66081	18,27940	157,68965	27,71394	120,75069	28,30359	149,94926	15,92077	154,36100
32,70000	118,59009	57,00000	126,10600	21,30000	148,06397	18,60000	154,97166	28,20000	118,66939	28,80000	147,36468	16,20000	151,70038
33,22728	116,70820	57,91911	124,10483	21,64346	145,71436	18,89992	152,51243	28,65472	116,78624	29,26439	145,02617	16,46122	149,29307
33,72085	114,99996	58,77946	122,28833	21,96495	143,58156	19,18066	150,28013	29,08036	115,07686	29,69909	142,90344	16,70574	147,10789
34,18315	113,44465	59,58531	120,63445	22,26609	141,63971	19,44363	148,24768	29,47905	113,52051	30,10626	140,97076	16,93477	145,11834
34,61648	112,02455	60,34066	119,12435	22,54835	139,86666	19,69011	146,39191	29,85275	112,09946	30,48791	139,20608	17,14945	143,30175
35,02295	110,72442	61,04918	117,74182	22,81311	138,24340	19,92131	144,69292	30,20328	110,79846	30,84590	137,59049	17,35082	141,63862
35,40451	109,53113	61,71429	116,47290	23,06165	136,75353	20,13835	143,13354	30,53233	109,60436	31,18195	136,10766	17,53985	140,11216
35,76297	108,43327	62,33913	115,30546	23,29515	135,38281	20,34224	141,69888	30,84146	108,50577	31,49766	134,74342	17,71744	138,70778
36,10000	107,42094	62,92661	114,22898	23,51468	134,11889	20,53394	140,37599	31,13211	107,49277	31,79450	133,48546	17,88440	137,41281
36,41713	106,48548	63,47941	113,23423	23,72125	132,95093	20,71433	139,15354	31,40560	106,55668	32,07381	132,32302	18,04152	136,21617
36,71579	105,61930	64,00000	112,31315	23,91579	131,86947	20,88421	138,02163	31,66316	105,68992	32,33684	131,24667	18,18947	135,10815
36,99727	104,81572	64,49066	111,45865	24,09914	130,86618	21,04432	136,97153	31,90591	104,88581	32,58476	130,24811	18,32892	134,08022
37,26279	104,06886	64,95349	110,66445	24,27209	129,93369	21,19535	135,99554	32,13488	104,13844	32,81860	129,32003	18,46047	133,12483
37,51345	103,37349	65,39041	109,92501	24,43537	129,06550	21,33792	135,08684	32,35105	103,44261	33,03937	128,45593	18,58464	132,23531
37,75027	102,72499	65,80322	109,23541	24,58962	128,25582	21,47263	134,23939	32,55528	102,79368	33,24794	127,65009	18,70197	131,40576
37,97419	102,11925	66,19355	108,59127	24,73548	127,49953	21,60000	133,44782	32,74839	102,18753	33,44516	126,89736	18,81290	130,63089
38,18609	101,55257	66,56291	107,98869	24,87351	126,79202	21,72053	132,70730	32,93113	101,62048	33,63179	126,19319	18,91788	129,90600
38,38677	101,02169	66,91271	107,42415	25,00422	126,12919	21,83468	132,01354	33,10418	101,08923	33,80853	125,53349	19,01730	129,22689
38,57696	100,52363	67,24424	106,89454	25,12811	125,50735	21,94286	131,36269	33,26820	100,59085	33,97604	124,91459	19,11152	128,58978
38,75735	100,05576	67,55868	106,39701	25,24561	124,92319	22,04546	130,75128	33,42377	100,12266	34,13491	124,33319	19,20089	127,99128
38,92857	99,61568	67,85714	105,92904	25,35714	124,37373	22,14286	130,17619	33,57143	99,68228	34,28571	123,78633	19,28571	127,42832
39,09121	99,20123	68,14064	105,48832	25,46308	123,85628	22,23537	129,63460	33,71169	99,26756	34,42896	123,27132	19,36629	126,89816
39,24581	98,81046	68,41012	105,07278	25,56378	123,36839	22,32330	129,12394	33,84501	98,87653	34,56511	122,78573	19,44288	126,39829
39,39286	98,44160	68,66645	104,68055	25,65957	122,90785	22,40695	128,64192	33,97182	98,50742	34,69463	122,32737	19,51573	125,92644
39,53284	98,09304	68,91045	104,30990	25,75075	122,47267	22,48657	128,18643	34,09254	98,15863	34,81791	121,89424	19,58507	125,48056
39,66617	97,76332	69,14286	103,95928	25,83759	122,06100	22,56241	127,75556	34,20752	97,82869	34,93534	121,48452	19,65113	125,05879
39,79325	97,45111	69,36438	103,62728	25,92037	121,67119	22,63469	127,34756	34,31711	97,51627	35,04726	121,09655	19,71409	124,65940
39,91445	97,15518	69,57566	103,31260	25,99932	121,30171	22,70363	126,96085	34,42164	97,22014	35,15402	120,72882	19,77413	124,28086
40,03013	96,87443	69,77729	103,01405	26,07467	120,95119	22,76943	126,59397	34,52140	96,93920	35,25590	120,37995	19,83144	123,92172
40,14060	96,60783	69,96985	102,73056	26,14663	120,61833	22,83227	126,24558	34,61666	96,67243	35,35319	120,04866	19,88617	123,58069
40,24615	96,35445	70,15385	102,46112	26,21538	120,30197	22,89231	125,91447	34,70769	96,41888	35,44615	119,73380	19,93846	123,25656
40,34708	96,11343	70,32977	102,20483	26,28112	120,00105	22,94971	125,59951	34,79473	96,17769	35,53504	119,43430	19,98846	122,94825
40,44363	95,88398	70,49807	101,96083	26,34402	119,71457	23,00463	125,29966	34,87799	95,94809	35,62008	119,14917	20,03629	122,65473
40,53605	95,66536	70,65917	101,72836	26,40422	119,44163	23,05720	125,01398	34,95770	95,72933	35,70148	118,87752	20,08208	122,37508
40,62457	95,45692	70,81347	101,50671	26,46187	119,18137	23,10755	124,74159	35,03403	95,52074	35,77944	118,61849	20,12593	122,10844
40,70939	95,25802	70,96133	101,29520	26,51713	118,93304	23,15580	124,48167	35,10718	95,32171	35,85414	118,37133	20,16796	121,85401
40,79072	95,06809	71,10309	101,09324	26,57010	118,69591	23,20206	124,23348	35,17732	95,13166	35,92577	118,13532	20,20825	121,61105
40,86874	94,88660	71,23909	100,90025	26,62092	118,46932	23,24644	123,99631	35,24460	94,95005	35,99449	117,90980	20,24690	121,37889
40,94362	94,71306	71,36962	100,71571	26,66970	118,25265	23,28903	123,76953	35,30918	94,77639	36,06044	117,69415	20,28400	121,15690
41,01553	94,54702	71,49496	100,53914	26,71654	118,04533	23,32993	123,55254	35,37119	94,61023	36,12377	117,48781	20,31962	120,94449
41,08462	94,38803	71,61538	100,37008	26,76154	117,84683	23,36923	123,34479	35,43077	94,45114	36,18462	117,29026	20,35385	120,74112

EK Tablo 2 Devamı

2006								DOY	n2ref	DOY	n2ref	DOY	n2ref
								1,56156	10,80000	230,65889	7,50000	231,45171	15,10000
								n1	u1	n1	u1	n1	u1
			Re1=1e13	Re1=1e13	Re1=1e13	Re1=1e13	Re1=1e13	6,00000	438,09420	6,70000	351,87468	7,10000	387,09454
step	Mach	Re2/Re1	M2/M1	Kappa	U2/U1	S2-S1	Cs2^2/Cs1^2	n2	u2	n2	u2	n2	u2
1,00000	1,15000	1,77820	0,76312	1,22383	0,81711	0,02571	1,14650	7,34297	357,97017	8,19965	287,51953	8,68918	316,29795
2,00000	1,20000	1,70411	0,70520	1,29730	0,77083	0,05550	1,19479	7,78378	337,69761	8,69189	271,23673	9,21081	298,38537
3,00000	1,30000	1,57303	0,61033	1,44136	0,69379	0,15718	1,29218	8,64819	303,94405	9,65714	244,12607	10,23369	268,56115
4,00000	1,40000	1,46067	0,53626	1,58065	0,63265	0,31681	1,39184	9,48387	277,16164	10,59032	222,61459	11,22258	244,89654
5,00000	1,50000	1,36329	0,47712	1,71429	0,58333	0,53199	1,49479	10,28571	255,55495	11,48571	205,26023	12,17143	225,80515
6,00000	1,60000	1,27808	0,42902	1,84173	0,54297	0,79777	1,60176	11,05036	237,87146	12,33957	191,05695	13,07626	210,18024
7,00000	1,70000	1,20290	0,38927	1,96265	0,50952	1,10824	1,71325	11,77589	223,21582	13,14975	179,28563	13,93480	197,23069
8,00000	1,80000	1,13608	0,35596	2,07692	0,48148	1,45739	1,82963	12,46154	210,93425	13,91538	169,42114	14,74615	186,37885
9,00000	1,90000	1,07628	0,32771	2,18457	0,45776	1,83948	1,95119	13,10741	200,54035	14,63661	161,07283	15,51044	177,19494
10,00000	2,00000	1,02247	0,30349	2,28571	0,43750	2,24924	2,07812	13,71429	191,66621	15,31429	153,94517	16,22857	169,35386
11,00000	2,10000	0,97378	0,28253	2,38057	0,42007	2,68195	2,21061	14,28340	184,02937	15,94980	147,81130	16,90202	162,60604
12,00000	2,20000	0,92952	0,26424	2,46939	0,40496	3,13341	2,34876	14,81633	177,41005	16,54490	142,49470	17,53265	156,75729
13,00000	2,30000	0,88910	0,24815	2,55247	0,39178	3,59997	2,49268	15,31484	171,63520	17,10157	137,85638	18,12256	151,65471
14,00000	2,40000	0,85206	0,23389	2,63014	0,38021	4,07845	2,64245	15,78082	166,56707	17,62192	133,78569	18,67397	147,17657
15,00000	2,50000	0,81797	0,22119	2,70270	0,37000	4,56609	2,79812	16,21622	162,09485	18,10811	130,19363	19,18919	143,22498
16,00000	2,60000	0,78651	0,20980	2,77049	0,36095	5,06053	2,95976	16,62295	158,12868	18,56230	127,00802	19,67049	139,72051
17,00000	2,70000	0,75738	0,19954	2,83382	0,35288	5,55974	3,12740	17,00292	154,59497	18,98659	124,16977	20,12012	136,59817
18,00000	2,80000	0,73033	0,19025	2,89299	0,34566	6,06199	3,30108	17,35793	151,43307	19,38303	121,63015	20,54022	133,80436
19,00000	2,90000	0,70515	0,18180	2,94829	0,33918	6,56580	3,48083	17,68975	148,59259	19,75355	119,34869	20,93287	131,29455
20,00000	3,00000	0,68165	0,17408	3,00000	0,33333	7,06992	3,66667	18,00000	146,03140	20,10000	117,29156	21,30000	129,03151
21,00000	3,10000	0,65966	0,16700	3,04837	0,32804	7,57329	3,85861	18,29025	143,71404	20,42411	115,43027	21,64346	126,98393
22,00000	3,20000	0,63904	0,16049	3,09366	0,32324	8,07502	4,05669	18,56193	141,61053	20,72749	113,74074	21,96495	125,12528
23,00000	3,30000	0,61968	0,15448	3,13607	0,31887	8,57435	4,26091	18,81641	139,69533	21,01166	112,20246	22,26609	123,43304
24,00000	3,40000	0,60145	0,14891	3,17582	0,31488	9,07066	4,47128	19,05495	137,94662	21,27802	110,79791	22,54835	121,88790
25,00000	3,50000	0,58427	0,14374	3,21311	0,31122	9,56342	4,68782	19,27869	136,34564	21,52787	109,51202	22,81311	120,47330
26,00000	3,60000	0,56804	0,13893	3,24812	0,30787	10,05221	4,91053	19,48872	134,87622	21,76241	108,33179	23,06165	119,17494
27,00000	3,70000	0,55269	0,13444	3,28101	0,30478	10,53666	5,13943	19,68604	133,52433	21,98274	107,24595	23,29515	117,98042
28,00000	3,80000	0,53814	0,13024	3,31193	0,30194	11,01648	5,37452	19,87156	132,27775	22,18991	106,24471	23,51468	116,87896
29,00000	3,90000	0,52434	0,12630	3,34102	0,29931	11,49146	5,61580	20,04613	131,12583	22,38484	105,31949	23,72125	115,86114
30,00000	4,00000	0,51123	0,12260	3,36842	0,29687	11,96141	5,86328	20,21053	130,05922	22,56842	104,46280	23,91579	114,91869
31,00000	4,10000	0,49876	0,11912	3,39425	0,29462	12,42618	6,11697	20,36547	129,06969	22,74144	103,66802	24,09914	114,04436
32,00000	4,20000	0,48689	0,11584	3,41860	0,29252	12,88568	6,37687	20,51163	128,15000	22,90465	102,92933	24,27209	113,23174
33,00000	4,30000	0,47557	0,11273	3,44160	0,29056	13,33983	6,64298	20,64960	127,29373	23,05872	102,24157	24,43537	112,47514
34,00000	4,40000	0,46476	0,10980	3,46333	0,28874	13,78858	6,91532	20,77996	126,49518	23,20429	101,60018	24,58962	111,76955
35,00000	4,50000	0,45443	0,10702	3,48387	0,28704	14,23192	7,19387	20,90323	125,74926	23,34194	101,00107	24,73548	111,11047
36,00000	4,60000	0,44455	0,10438	3,50331	0,28544	14,66983	7,47864	21,01987	125,05146	23,47219	100,44060	24,87351	110,49390
37,00000	4,70000	0,43509	0,10187	3,52172	0,28395	15,10233	7,76964	21,13033	124,39773	23,59554	99,91552	25,00422	109,91627
38,00000	4,80000	0,42603	0,09948	3,53917	0,28255	15,52944	8,06686	21,23502	123,78443	23,71244	99,42292	25,12811	109,37437
39,00000	4,90000	0,41733	0,09721	3,55572	0,28124	15,95120	8,37032	21,33432	123,20829	23,82332	98,96017	25,24561	108,86530
40,00000	5,00000	0,40899	0,09504	3,57143	0,28000	16,36765	8,68000	21,42857	122,66638	23,92857	98,52491	25,35714	108,38647
41,00000	5,10000	0,40097	0,09297	3,58635	0,27884	16,77884	8,99592	21,51810	122,15602	24,02854	98,11500	25,46308	107,93553
42,00000	5,20000	0,39326	0,09099	3,60053	0,27774	17,18483	9,31807	21,60320	121,67483	24,12357	97,72851	25,56378	107,51035
43,00000	5,30000	0,38584	0,08909	3,61402	0,27670	17,58569	9,64645	21,68414	121,22062	24,21396	97,36369	25,65957	107,10902
44,00000	5,40000	0,37869	0,08727	3,62687	0,27572	17,98149	9,98107	21,76119	120,79141	24,30000	97,01894	25,75075	106,72977
45,00000	5,50000	0,37181	0,08553	3,63910	0,27479	18,37230	10,32193	21,83459	120,38539	24,38195	96,69284	25,83759	106,37102
46,00000	5,60000	0,36517	0,08386	3,65076	0,27392	18,75819	10,66902	21,90454	120,00093	24,46007	96,38404	25,92037	106,03132
47,00000	5,70000	0,35876	0,08225	3,66188	0,27308	19,13925	11,02235	21,97126	119,63653	24,53457	96,09135	25,99932	105,70933
48,00000	5,80000	0,35258	0,08071	3,67249	0,27229	19,51555	11,38193	22,03493	119,29081	24,60568	95,81368	26,07467	105,40386
49,00000	5,90000	0,34660	0,07923	3,68262	0,27155	19,88717	11,74774	22,09574	118,96252	24,67358	95,55000	26,14663	105,11379
50,00000	6,00000	0,34082	0,07780	3,69231	0,27083	20,25419	12,11979	22,15385	118,65051	24,73846	95,29939	26,21538	104,83810
51,00000	6,10000	0,33524	0,07642	3,70157	0,27016	20,61669	12,49809	22,20940	118,35372	24,80050	95,06101	26,28112	104,57586
52,00000	6,20000	0,32983	0,07509	3,71042	0,26951	20,97476	12,88262	22,26255	118,07117	24,85985	94,83407	26,34402	104,32621
53,00000	6,30000	0,32459	0,07381	3,71890	0,26890	21,32847	13,27340	22,31342	117,80197	24,91665	94,61785	26,40422	104,08835
54,00000	6,40000	0,31952	0,07257	3,72702	0,26831	21,67791	13,67042	22,36215	117,54529	24,97106	94,41169	26,46187	103,86155
55,00000	6,50000	0,31461	0,07137	3,73481	0,26775	22,02315	14,07369	22,40884	117,30037	25,02320	94,21497	26,51713	103,64513
56,00000	6,60000	0,30984	0,07022	3,74227	0,26722	22,36427	14,48320	22,45361	117,06649	25,07320	94,02712	26,57010	103,43848
57,00000	6,70000	0,30521	0,06910	3,74943	0,26671	22,70136	14,89895	22,49655	116,84301	25,12115	93,84762	26,62092	103,24102
58,00000	6,80000	0,30073	0,06801	3,75630	0,26622	23,03447	15,32095	22,53777	116,62932	25,16718	93,67598	26,66970	103,05220
59,00000	6,90000	0,29637	0,06697	3,76289	0,26575	23,36370	15,74919	22,57736	116,42485	25,21138	93,51175	26,71654	102,87153
60,00000	7,00000	0,29213	0,06595	3,76923	0,26531	23,68912	16,18367	22,61538	116,22907	25,25385	93,35451	26,76154	102,69855

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DOY	n2ref	DOY	n2ref	DOY	n2ref	DOY	n2ref
274,36781	FR	280,82948	FR	348,57774	3,90000	350,72297	9,70000
n1	u1	n1	u1	n1	u1	n1	u1
FR	FR	FR	FR	1,90000	596,46607	1,70000	564,22731
n2	u2	n2	u2	n2	u2	n2	u2
9,05633	329,81619	3,42672	446,66250	2,32527	487,37705	2,08051	461,03451
9,60000	311,13805	3,63243	421,36713	2,46486	459,77593	2,20541	434,92522
10,66610	280,03917	4,03582	379,25063	2,73859	413,82039	2,45032	391,45356
11,69677	255,36317	4,42581	345,83248	3,00323	377,35608	2,68710	356,96014
12,68571	235,45582	4,80000	318,87242	3,25714	347,93854	2,91429	329,13260
13,62878	219,16312	5,15683	296,80759	3,49928	323,86244	3,13094	306,35780
14,52360	205,66013	5,49542	278,52079	3,72903	303,90875	3,33650	287,48260
15,36923	194,34449	5,81538	263,19628	3,94615	287,18737	3,53077	271,66500
16,16581	184,76806	6,11679	250,22715	4,15068	273,03606	3,71377	258,27857
16,91429	176,59187	6,40000	239,15432	4,34286	260,95390	3,88571	246,84945
17,61619	169,55565	6,66559	229,62533	4,52308	250,55632	4,04696	237,01385
18,27347	163,45693	6,91429	221,36598	4,69184	241,54411	4,19796	228,48875
18,88830	158,13628	7,14692	214,16033	4,84970	233,68165	4,33920	221,05125
19,46301	153,46674	7,36438	207,83649	4,99726	226,78137	4,47123	214,52393
20,00000	149,34626	7,56757	202,25622	5,13514	220,69245	4,59459	208,76411
20,50164	145,69202	7,75738	197,30736	5,26393	215,29249	4,70984	203,65601
20,97026	142,43624	7,93469	192,89813	5,38426	210,48134	4,81749	199,10491
21,40812	139,52302	8,10037	188,95283	5,49668	206,17641	4,91808	195,03266
21,81735	136,90594	8,25521	185,40858	5,60175	202,30909	5,01209	191,37436
22,20000	134,54618	8,40000	182,21281	5,70000	198,82202	5,10000	188,07577
22,55797	132,41109	8,53545	179,32130	5,79191	195,66694	5,18224	185,09122
22,89305	130,47301	8,66224	176,69660	5,87795	192,80300	5,25921	182,38207
23,20691	128,70844	8,78099	174,30688	5,95853	190,19545	5,33132	179,91546
23,50110	127,09726	8,89231	172,12491	6,03407	187,81457	5,39890	177,66327
23,77705	125,62220	8,99672	170,12727	6,10492	185,63485	5,46230	175,60136
24,03609	124,26835	9,09474	168,29378	6,17143	183,63423	5,52180	173,70887
24,27945	123,02278	9,18682	166,60693	6,23391	181,79362	5,57771	171,96775
24,50826	121,87424	9,27339	165,05149	6,29266	180,09640	5,63028	170,36226
24,72356	120,81292	9,35486	163,61417	6,34794	178,52806	5,67974	168,87869
24,92632	119,83019	9,43158	162,28329	6,40000	177,07586	5,72632	167,50498
25,11742	118,91850	9,50389	161,04859	6,44907	175,72863	5,77022	166,23056
25,29767	118,07114	9,57209	159,90104	6,49535	174,47647	5,81163	165,04608
25,46785	117,28221	9,63648	158,83261	6,53904	173,31065	5,85072	163,94328
25,62862	116,54646	9,69732	157,83620	6,58032	172,22342	5,88766	162,91481
25,78065	115,85921	9,75484	156,90548	6,61935	171,20785	5,92258	161,95414
25,92450	115,21630	9,80927	156,03479	6,65629	170,25780	5,95563	161,05543
26,06074	114,61398	9,86082	155,21909	6,69127	169,36774	5,98693	160,21348
26,18986	114,04891	9,90968	154,45383	6,72442	168,53273	6,01659	159,42360
26,31233	113,51809	9,95602	153,73495	6,75587	167,74832	6,04472	158,68159
26,42857	113,01879	10,00000	153,05876	6,78571	167,01050	6,07143	157,98365
26,53899	112,54858	10,04178	152,42196	6,81406	166,31565	6,09679	157,32636
26,64394	112,10523	10,08149	151,82155	6,84101	165,66051	6,12091	156,70662
26,74378	111,68674	10,11927	151,25480	6,86665	165,04210	6,14384	156,12164
26,83881	111,29129	10,15522	150,71924	6,89104	164,45772	6,16567	155,56885
26,92932	110,91721	10,18947	150,21263	6,91429	163,90493	6,18647	155,04594
27,01560	110,56298	10,22212	149,73291	6,93644	163,38149	6,20629	154,55078
27,09789	110,22724	10,25325	149,27822	6,95757	162,88536	6,22519	154,08147
27,17642	109,90871	10,28297	148,84685	6,97773	162,41466	6,24323	153,63621
27,25141	109,60625	10,31135	148,43723	6,99698	161,96770	6,26046	153,21341
27,32308	109,31877	10,33846	148,04791	7,01538	161,54289	6,27692	152,81156
27,39159	109,04532	10,36439	147,67758	7,03298	161,13881	6,29266	152,42932
27,45714	108,78500	10,38919	147,32503	7,04981	160,75412	6,30772	152,06543
27,51989	108,53697	10,41293	146,98913	7,06592	160,38761	6,32214	151,71872
27,57998	108,30048	10,43567	146,66886	7,08135	160,03814	6,33594	151,38814
27,63757	108,07482	10,45746	146,36325	7,09613	159,70467	6,34917	151,07270
27,69278	107,85934	10,47835	146,07143	7,11031	159,38625	6,36186	150,77149
27,74575	107,65343	10,49839	145,79257	7,12391	159,08198	6,37402	150,48366
27,79659	107,45654	10,51763	145,52593	7,13696	158,79103	6,38570	150,20844
27,84541	107,26815	10,53610	145,27080	7,14950	158,51264	6,39692	149,94510
27,89231	107,08778	10,55385	145,02652	7,16154	158,24610	6,40769	149,69296

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2007								DOY	n2ref	DOY	n2ref	DOY	n2ref	DOY	n2ref
								84,18776	11,30000	127,45647	FR	316,89278	19,70000	351,08577	16,60000
								n1	u1	n1	u1	n1	u1	n1	u1
			Re1=1e13	Re1=1e13	Re1=1e13	Re1=1e13	Re1=1e13	4,00000	378,82570	FR	FR	13,50000	387,93269	9,20000	352,65103
step	Mach	Re2/Re1	M2/M1	Kappa	U2/U1	S2-S1	Cs2^2/Cs1^2	n2	u2	n2	u2	n2	u2	n2	u2
1,00000	1,15000	1,77820	0,76312	1,22383	0,81711	0,02571	1,14650	4,89532	309,37799	11,13684	314,81203	16,52169	316,98281	11,25922	288,15389
2,00000	1,20000	1,70411	0,70520	1,29730	0,77083	0,05550	1,19479	5,18919	291,85731	11,80541	296,98361	17,51351	299,03145	11,93514	271,83517
3,00000	1,30000	1,57303	0,61033	1,44136	0,69379	0,15718	1,29218	5,76546	262,68558	13,11642	267,29949	19,45842	269,14265	13,26055	244,66469
4,00000	1,40000	1,46067	0,53626	1,58065	0,63265	0,31681	1,39184	6,32258	239,53871	14,38387	243,74606	21,33871	245,42680	14,54194	223,10575
5,00000	1,50000	1,36329	0,47712	1,71429	0,58333	0,53199	1,49479	6,85714	220,86499	15,60000	224,74435	23,14286	226,29407	15,77143	205,71310
6,00000	1,60000	1,27808	0,42902	1,84173	0,54297	0,79777	1,60176	7,36691	205,58192	16,75971	209,19284	24,86331	210,63533	16,94388	191,47849
7,00000	1,70000	1,20290	0,38927	1,96265	0,50952	1,10824	1,71325	7,85059	192,91569	17,86010	196,30414	26,49576	197,65774	18,05637	179,68119
8,00000	1,80000	1,13608	0,35596	2,07692	0,48148	1,45739	1,82963	8,30769	182,30126	18,90000	185,50327	28,03846	186,78241	19,10769	169,79494
9,00000	1,90000	1,07628	0,32771	2,18457	0,45776	1,83948	1,95119	8,73828	173,31827	19,87958	176,36250	29,49168	177,57861	20,09803	161,42821
10,00000	2,00000	1,02247	0,30349	2,28571	0,43750	2,24924	2,07812	9,14286	165,64874	20,80000	168,55826	30,85714	169,72055	21,02857	154,28483
11,00000	2,10000	0,97378	0,28253	2,38057	0,42007	2,68195	2,21061	9,52227	159,04855	21,66316	161,84214	32,13765	162,95812	21,90121	148,13742
12,00000	2,20000	0,92952	0,26424	2,46939	0,40496	3,13341	2,34876	9,87755	153,32776	22,47143	156,02087	33,33673	157,09671	22,71837	142,80910
13,00000	2,30000	0,88910	0,24815	2,55247	0,39178	3,59997	2,49268	10,20989	148,33682	23,22750	150,94226	34,45838	151,98308	23,48275	138,16054
14,00000	2,40000	0,85206	0,23389	2,63014	0,38021	4,07845	2,64245	10,52055	143,95665	23,93425	146,48516	35,50685	147,49524	24,19726	134,08086
15,00000	2,50000	0,81797	0,22119	2,70270	0,37000	4,56609	2,79812	10,81081	140,09151	24,59459	142,55213	36,48649	143,53509	24,86486	130,48088
16,00000	2,60000	0,78651	0,20980	2,77049	0,36095	5,06053	2,95976	11,08197	136,66371	25,21148	139,06413	37,40164	140,02304	25,48852	127,28824
17,00000	2,70000	0,75738	0,19954	2,83382	0,35288	5,55974	3,12740	11,33528	133,60969	25,78776	135,95646	38,25656	136,89394	26,07114	124,44373
18,00000	2,80000	0,73033	0,19025	2,89299	0,34566	6,06199	3,30108	11,57196	130,87700	26,32620	133,17577	39,05535	134,09408	26,61550	121,89851
19,00000	2,90000	0,70515	0,18180	2,94829	0,33918	6,56580	3,48083	11,79316	128,42209	26,82945	130,67775	39,80193	131,57883	27,12428	119,61202
20,00000	3,00000	0,68165	0,17408	3,00000	0,33333	7,06992	3,66667	12,00000	126,20857	27,30000	128,42534	40,50000	129,31090	27,60000	117,55034
21,00000	3,10000	0,65966	0,16700	3,04837	0,32804	7,57329	3,85861	12,19350	124,20578	27,74021	126,38738	41,15305	127,25888	28,04504	115,68495
22,00000	3,20000	0,63904	0,16049	3,09366	0,32324	8,07502	4,05669	12,37462	122,38780	28,15227	124,53747	41,76435	125,39621	28,46163	113,99169
23,00000	3,30000	0,61968	0,15448	3,13607	0,31887	8,57435	4,26091	12,54428	120,73257	28,53823	122,85317	42,33693	123,70030	28,85184	112,45002
24,00000	3,40000	0,60145	0,14891	3,17582	0,31488	9,07066	4,47128	12,70330	119,22124	28,90000	121,31529	42,87363	122,15182	29,21758	111,04237
25,00000	3,50000	0,58427	0,14374	3,21311	0,31122	9,56342	4,68782	12,85246	117,83759	29,23934	119,90734	43,37705	120,73415	29,56066	109,75364
26,00000	3,60000	0,56804	0,13893	3,24812	0,30787	10,05221	4,91053	12,99248	116,56763	29,55789	118,61507	43,84962	119,43298	29,88271	108,57080
27,00000	3,70000	0,55269	0,13444	3,28101	0,30478	10,53666	5,13943	13,12403	115,39925	29,85716	117,42617	44,29359	118,23588	30,18526	107,48257
28,00000	3,80000	0,53814	0,13024	3,31193	0,30194	11,01648	5,37452	13,24771	114,32189	30,13853	116,32988	44,71101	117,13203	30,46972	106,47912
29,00000	3,90000	0,52434	0,12630	3,34102	0,29931	11,49146	5,61580	13,36409	113,32633	30,40329	115,31684	45,10379	116,11200	30,73740	105,55186
30,00000	4,00000	0,51123	0,12260	3,36842	0,29687	11,96141	5,86328	13,47368	112,40450	30,65263	114,37882	45,47368	115,16752	30,98947	104,69327
31,00000	4,10000	0,49876	0,11912	3,39425	0,29462	12,42618	6,11697	13,57698	111,54930	30,88763	113,50860	45,82231	114,29129	31,22706	103,89674
32,00000	4,20000	0,48689	0,11584	3,41860	0,29252	12,88568	6,37687	13,67442	110,75446	31,10930	112,69979	46,15116	113,47691	31,45116	103,15642
33,00000	4,30000	0,47557	0,11273	3,44160	0,29056	13,33983	6,64298	13,76640	110,01442	31,31857	111,94675	46,46161	112,71868	31,66273	102,46715
34,00000	4,40000	0,46476	0,10980	3,46333	0,28874	13,78858	6,91532	13,85331	109,32426	31,51628	111,24447	46,75492	112,01156	31,86261	101,82434
35,00000	4,50000	0,45443	0,10702	3,48387	0,28704	14,23192	7,19387	13,93548	108,67960	31,70323	110,58849	47,03226	111,35105	32,05161	101,22391
36,00000	4,60000	0,44455	0,10438	3,50331	0,28544	14,66983	7,47864	14,01325	108,07652	31,88013	109,97482	47,29470	110,73315	32,23046	100,66220
37,00000	4,70000	0,43509	0,10187	3,52172	0,28395	15,10233	7,76964	14,08689	107,51153	32,04767	109,39991	47,54324	110,15427	32,39984	100,13597
38,00000	4,80000	0,42603	0,09948	3,53917	0,28255	15,52944	8,06686	14,15668	106,98148	32,20645	108,86055	47,77880	109,61119	32,56037	99,64228
39,00000	4,90000	0,41733	0,09721	3,55572	0,28124	15,95120	8,37032	14,22288	106,48355	32,35705	108,35387	48,00222	109,10102	32,71262	99,17851
40,00000	5,00000	0,40899	0,09504	3,57143	0,28000	16,36765	8,68000	14,28571	106,01520	32,50000	107,87729	48,21429	108,62115	32,85714	98,74229
41,00000	5,10000	0,40097	0,09297	3,58635	0,27884	16,77884	8,99592	14,34540	105,57412	32,63578	107,42847	48,41572	108,16924	32,99442	98,33147
42,00000	5,20000	0,39326	0,09099	3,60053	0,27774	17,18483	9,31807	14,40213	105,15825	32,76485	107,00529	48,60719	107,74314	33,12490	97,94413
43,00000	5,30000	0,38584	0,08909	3,61402	0,27670	17,58569	9,64645	14,45610	104,76569	32,88762	106,60584	48,78932	107,34093	33,24902	97,57850
44,00000	5,40000	0,37869	0,08727	3,62687	0,27572	17,98149	9,98107	14,50746	104,39474	33,00448	106,22837	48,96269	106,96086	33,36716	97,23300
45,00000	5,50000	0,37181	0,08553	3,63910	0,27479	18,37230	10,32193	14,55639	104,04384	33,11579	105,87131	49,12782	106,60134	33,47970	96,90617
46,00000	5,60000	0,36517	0,08386	3,65076	0,27392	18,75819	10,66902	14,60303	103,71157	33,22189	105,53320	49,28522	106,26090	33,58696	96,59670
47,00000	5,70000	0,35876	0,08225	3,66188	0,27308	19,13925	11,02235	14,64751	103,39663	33,32308	105,21273	49,43533	105,93822	33,68926	96,30336
48,00000	5,80000	0,35258	0,08071	3,67249	0,27229	19,51555	11,38193	14,68996	103,09784	33,41965	104,90869	49,57860	105,63209	33,78690	96,02507
49,00000	5,90000	0,34660	0,07923	3,68262	0,27155	19,88717	11,74774	14,73049	102,81412	33,51188	104,61999	49,71542	105,34139	33,88014	95,76081
50,00000	6,00000	0,34082	0,07780	3,69231	0,27083	20,25419	12,11979	14,76923	102,54446	33,60000	104,34559	49,84615	105,06510	33,96923	95,50965
51,00000	6,10000	0,33524	0,07642	3,70157	0,27016	20,61669	12,49809	14,80627	102,28796	33,68426	104,08458	49,97115	104,80229	34,05441	95,27075
52,00000	6,20000	0,32983	0,07509	3,71042	0,26951	20,97476	12,88262	14,84170	102,04376	33,76486	103,83610	50,09073	104,55210	34,13591	95,04331
53,00000	6,30000	0,32459	0,07381	3,71890	0,26890	21,32847	13,27340	14,87561	101,81111	33,84202	103,59936	50,20520	104,31372	34,21391	94,82661
54,00000	6,40000	0,31952	0,07257	3,72702	0,26831	21,67791	13,67042	14,90810	101,58927	33,91592	103,37362	50,31483	104,08643	34,28863	94,61999
55,00000	6,50000	0,31461	0,07137	3,73481	0,26775	22,02315	14,07369	14,93923	101,37759	33,98674	103,15823	50,41989	103,86955	34,36022	94,42284
56,00000	6,60000	0,30984	0,07022	3,74227	0,26722	22,36427	14,48320	14,96907	101,17546	34,05464	102,95255	50,52062	103,66245	34,42887	94,23457
57,00000	6,70000	0,30521	0,06910	3,74943	0,26671	22,70136	14,89895	14,99770	100,98232	34,11977	102,75601	50,61725	103,46456	34,49472	94,05468
58,00000	6,80000	0,30073	0,06801	3,75630	0,26622	23,03447	15,32095	15,02518	100,79763	34,18229	102,56808	50,70999	103,27533	34,55792	93,88266
59,00000	6,90000	0,29637	0,06697	3,76289	0,26575	23,36370	15,74919	15,05157	100,62091	34,24232	102,38826	50,79905	103,09427	34,61861	93,71807
60,00000	7,00000	0,29213	0,06595	3,76923	0,26531	23,68912	16,18367	15,07692	100,45172	34,30000	102,21609	50,88462	102,92092	34,67692	93,56048

EK Tablo 2 Devamı

2008								DOY	n2ref	DOY	n2ref
								194,36988	6,90000	221,95294	10,70000
								n1	u1	n1	u1
			Re1=1e13	Re1=1e13	Re1=1e13	Re1=1e13	Re1=1e13	6,70000	548,32207	6,60000	377,07255
step	Mach	Re2/Re1	M2/M1	Kappa	U2/U1	S2-S1	Cs2^2/Cs1^2	n2	u2	n2	u2
1,00000	1,15000	1,77820	0,76312	1,22383	0,81711	0,02571	1,14650	8,19965	448,03821	8,07727	308,10891
2,00000	1,20000	1,70411	0,70520	1,29730	0,77083	0,05550	1,19479	8,69189	422,66493	8,56216	290,66009
3,00000	1,30000	1,57303	0,61033	1,44136	0,69379	0,15718	1,29218	9,65714	380,41871	9,51301	261,60803
4,00000	1,40000	1,46067	0,53626	1,58065	0,63265	0,31681	1,39184	10,59032	346,89763	10,43226	238,55610
5,00000	1,50000	1,36329	0,47712	1,71429	0,58333	0,53199	1,49479	11,48571	319,85454	11,31429	219,95899
6,00000	1,60000	1,27808	0,42902	1,84173	0,54297	0,79777	1,60176	12,33957	297,72175	12,15540	204,73861
7,00000	1,70000	1,20290	0,38927	1,96265	0,50952	1,10824	1,71325	13,14975	279,37863	12,95348	192,12434
8,00000	1,80000	1,13608	0,35596	2,07692	0,48148	1,45739	1,82963	13,91538	264,00692	13,70769	181,55345
9,00000	1,90000	1,07628	0,32771	2,18457	0,45776	1,83948	1,95119	14,63661	250,99784	14,41815	172,60731
10,00000	2,00000	1,02247	0,30349	2,28571	0,43750	2,24924	2,07812	15,31429	239,89090	15,08571	164,96924
11,00000	2,10000	0,97378	0,28253	2,38057	0,42007	2,68195	2,21061	15,94980	230,33257	15,71174	158,39612
12,00000	2,20000	0,92952	0,26424	2,46939	0,40496	3,13341	2,34876	16,54490	222,04778	16,29796	152,69880
13,00000	2,30000	0,88910	0,24815	2,55247	0,39178	3,59997	2,49268	17,10157	214,81994	16,84632	147,72833
14,00000	2,40000	0,85206	0,23389	2,63014	0,38021	4,07845	2,64245	17,62192	208,47662	17,35890	143,36613
15,00000	2,50000	0,81797	0,22119	2,70270	0,37000	4,56609	2,79812	18,10811	202,87917	17,83784	139,51684
16,00000	2,60000	0,78651	0,20980	2,77049	0,36095	5,06053	2,95976	18,56230	197,91507	18,28525	136,10311
17,00000	2,70000	0,75738	0,19954	2,83382	0,35288	5,55974	3,12740	18,98659	193,49225	18,70321	133,06161
18,00000	2,80000	0,73033	0,19025	2,89299	0,34566	6,06199	3,30108	19,38303	189,53480	19,09373	130,34013
19,00000	2,90000	0,70515	0,18180	2,94829	0,33918	6,56580	3,48083	19,75355	185,97963	19,45872	127,89530
20,00000	3,00000	0,68165	0,17408	3,00000	0,33333	7,06992	3,66667	20,10000	182,77402	19,80000	125,69085
21,00000	3,10000	0,65966	0,16700	3,04837	0,32804	7,57329	3,85861	20,42411	179,87360	20,11927	123,69628
22,00000	3,20000	0,63904	0,16049	3,09366	0,32324	8,07502	4,05669	20,72749	177,24082	20,41813	121,88576
23,00000	3,30000	0,61968	0,15448	3,13607	0,31887	8,57435	4,26091	21,01166	174,84374	20,69806	120,23732
24,00000	3,40000	0,60145	0,14891	3,17582	0,31488	9,07066	4,47128	21,27802	172,65505	20,96044	118,73219
25,00000	3,50000	0,58427	0,14374	3,21311	0,31122	9,56342	4,68782	21,52787	170,65126	21,20656	117,35421
26,00000	3,60000	0,56804	0,13893	3,24812	0,30787	10,05221	4,91053	21,76241	168,81212	21,43759	116,08947
27,00000	3,70000	0,55269	0,13444	3,28101	0,30478	10,53666	5,13943	21,98274	167,12008	21,65464	114,92587
28,00000	3,80000	0,53814	0,13024	3,31193	0,30194	11,01648	5,37452	22,18991	165,55985	21,85872	113,85293
29,00000	3,90000	0,52434	0,12630	3,34102	0,29931	11,49146	5,61580	22,38484	164,11809	22,05074	112,86146
30,00000	4,00000	0,51123	0,12260	3,36842	0,29687	11,96141	5,86328	22,56842	162,78311	22,23158	111,94341
31,00000	4,10000	0,49876	0,11912	3,39425	0,29462	12,42618	6,11697	22,74144	161,54462	22,40202	111,09172
32,00000	4,20000	0,48689	0,11584	3,41860	0,29252	12,88568	6,37687	22,90465	160,39353	22,56279	110,30013
33,00000	4,30000	0,47557	0,11273	3,44160	0,29056	13,33983	6,64298	23,05872	159,32181	22,71456	109,56313
34,00000	4,40000	0,46476	0,10980	3,46333	0,28874	13,78858	6,91532	23,20429	158,32233	22,85796	108,87580
35,00000	4,50000	0,45443	0,10702	3,48387	0,28704	14,23192	7,19387	23,34194	157,38874	22,99355	108,23379
36,00000	4,60000	0,44455	0,10438	3,50331	0,28544	14,66983	7,47864	23,47219	156,51537	23,12185	107,63319
37,00000	4,70000	0,43509	0,10187	3,52172	0,28395	15,10233	7,76964	23,59554	155,69716	23,24336	107,07051
38,00000	4,80000	0,42603	0,09948	3,53917	0,28255	15,52944	8,06686	23,71244	154,92954	23,35853	106,54264
39,00000	4,90000	0,41733	0,09721	3,55572	0,28124	15,95120	8,37032	23,82332	154,20844	23,46775	106,04675
40,00000	5,00000	0,40899	0,09504	3,57143	0,28000	16,36765	8,68000	23,92857	153,53018	23,57143	105,58031
41,00000	5,10000	0,40097	0,09297	3,58635	0,27884	16,77884	8,99592	24,02854	152,89142	23,66991	105,14105
42,00000	5,20000	0,39326	0,09099	3,60053	0,27774	17,18483	9,31807	24,12357	152,28915	23,76352	104,72688
43,00000	5,30000	0,38584	0,08909	3,61402	0,27670	17,58569	9,64645	24,21396	151,72066	23,85256	104,33594
44,00000	5,40000	0,37869	0,08727	3,62687	0,27572	17,98149	9,98107	24,30000	151,18345	23,93731	103,96651
45,00000	5,50000	0,37181	0,08553	3,63910	0,27479	18,37230	10,32193	24,38195	150,67528	24,01805	103,61704
46,00000	5,60000	0,36517	0,08386	3,65076	0,27392	18,75819	10,66902	24,46007	150,19409	24,09499	103,28614
47,00000	5,70000	0,35876	0,08225	3,66188	0,27308	19,13925	11,02235	24,53457	149,73800	24,16839	102,97249
48,00000	5,80000	0,35258	0,08071	3,67249	0,27229	19,51555	11,38193	24,60568	149,30530	24,23843	102,67493
49,00000	5,90000	0,34660	0,07923	3,68262	0,27155	19,88717	11,74774	24,67358	148,89441	24,30532	102,39237
50,00000	6,00000	0,34082	0,07780	3,69231	0,27083	20,25419	12,11979	24,73846	148,50389	24,36923	102,12382
51,00000	6,10000	0,33524	0,07642	3,70157	0,27016	20,61669	12,49809	24,80050	148,13243	24,43034	101,86836
52,00000	6,20000	0,32983	0,07509	3,71042	0,26951	20,97476	12,88262	24,85985	147,77879	24,48880	101,62517
53,00000	6,30000	0,32459	0,07381	3,71890	0,26890	21,32847	13,27340	24,91665	147,44186	24,54476	101,39347
54,00000	6,40000	0,31952	0,07257	3,72702	0,26831	21,67791	13,67042	24,97106	147,12059	24,59836	101,17254
55,00000	6,50000	0,31461	0,07137	3,73481	0,26775	22,02315	14,07369	25,02320	146,81404	24,64972	100,96173
56,00000	6,60000	0,30984	0,07022	3,74227	0,26722	22,36427	14,48320	25,07320	146,52132	24,69897	100,76043
57,00000	6,70000	0,30521	0,06910	3,74943	0,26671	22,70136	14,89895	25,12115	146,24161	24,74621	100,56808
58,00000	6,80000	0,30073	0,06801	3,75630	0,26622	23,03447	15,32095	25,16718	145,97415	24,79155	100,38415
59,00000	6,90000	0,29637	0,06697	3,76289	0,26575	23,36370	15,74919	25,21138	145,71823	24,83509	100,20816
60,00000	7,00000	0,29213	0,06595	3,76923	0,26531	23,68912	16,18367	25,25385	145,47320	24,87692	100,03966

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2010				DOY	n2ref	DOY	n2ref
				95,32985	8,30000	215,70490	10,90000
				n1	u1	n1	u1
Re1=1e13	Re1=1e13	Re1=1e13	Re1=1e13	3,00000	574,13721	4,60000	416,64635
Kappa	U2/U1	S2-S1	Cs2^2/Cs1^2	n2	u2	n2	u2
1,22383	0,81711	0,02571	1,14650	3,67149	469,13197	5,62961	340,44496
1,29730	0,77083	0,05550	1,19479	3,89189	442,56410	5,96757	321,16489
1,44136	0,69379	0,15718	1,29218	4,32409	398,32892	6,63028	289,06381
1,58065	0,63265	0,31681	1,39184	4,74194	363,22967	7,27097	263,59259
1,71429	0,58333	0,53199	1,49479	5,14286	334,91337	7,88571	243,04370
1,84173	0,54297	0,79777	1,60176	5,52518	311,73857	8,47194	226,22595
1,96265	0,50952	1,10824	1,71325	5,88795	292,53185	9,02818	212,28780
2,07692	0,48148	1,45739	1,82963	6,23077	276,43644	9,55385	200,60750
2,18457	0,45776	1,83948	1,95119	6,55371	262,81489	10,04902	190,72246
2,28571	0,43750	2,24924	2,07812	6,85714	251,18503	10,51429	182,28278
2,38057	0,42007	2,68195	2,21061	7,14170	241,17669	10,95061	175,01981
2,46939	0,40496	3,13341	2,34876	7,40816	232,50185	11,35918	168,72455
2,55247	0,39178	3,59997	2,49268	7,65742	224,93372	11,74138	163,23243
2,63014	0,38021	4,07845	2,64245	7,89041	218,29175	12,09863	158,41241
2,70270	0,37000	4,56609	2,79812	8,10811	212,43077	12,43243	154,15915
2,77049	0,36095	5,06053	2,95976	8,31148	207,23296	12,74426	150,38714
2,83382	0,35288	5,55974	3,12740	8,50146	202,60192	13,03557	147,02644
2,89299	0,34566	6,06199	3,30108	8,67897	198,45814	13,30775	144,01934
2,94829	0,33918	6,56580	3,48083	8,84487	194,73560	13,56214	141,31792
3,00000	0,33333	7,06992	3,66667	9,00000	191,37907	13,80000	138,88212
3,04837	0,32804	7,57329	3,85861	9,14512	188,34210	14,02252	136,67821
3,09366	0,32324	8,07502	4,05669	9,28097	185,58537	14,23082	134,67768
3,13607	0,31887	8,57435	4,26091	9,40821	183,07543	14,42592	132,85624
3,17582	0,31488	9,07066	4,47128	9,52747	180,78369	14,60879	131,19314
3,21311	0,31122	9,56342	4,68782	9,63934	178,68556	14,78033	129,67055
3,24812	0,30787	10,05221	4,91053	9,74436	176,75984	14,94135	128,27307
3,28101	0,30478	10,53666	5,13943	9,84302	174,98813	15,09263	126,98736
3,31193	0,30194	11,01648	5,37452	9,93578	173,35445	15,23486	125,80181
3,34102	0,29931	11,49146	5,61580	10,02306	171,84482	15,36870	124,70628
3,36842	0,29687	11,96141	5,86328	10,10526	170,44699	15,49474	123,69188
3,39425	0,29462	12,42618	6,11697	10,18274	169,15018	15,61353	122,75081
3,41860	0,29252	12,88568	6,37687	10,25581	167,94490	15,72558	121,87614
3,44160	0,29056	13,33983	6,64298	10,32480	166,82272	15,83136	121,06179
3,46333	0,28874	13,78858	6,91532	10,38998	165,77619	15,93131	120,30233
3,48387	0,28704	14,23192	7,19387	10,45161	164,79864	16,02581	119,59293
3,50331	0,28544	14,66983	7,47864	10,50993	163,88416	16,11523	118,92930
3,52172	0,28395	15,10233	7,76964	10,56517	163,02742	16,19992	118,30757
3,53917	0,28255	15,52944	8,06686	10,61751	162,22367	16,28018	117,72429
3,55572	0,28124	15,95120	8,37032	10,66716	161,46862	16,35631	117,17636
3,57143	0,28000	16,36765	8,68000	10,71429	160,75842	16,42857	116,66098
3,58635	0,27884	16,77884	8,99592	10,75905	160,08959	16,49721	116,17561
3,60053	0,27774	17,18483	9,31807	10,80160	159,45897	16,56245	115,71798
3,61402	0,27670	17,58569	9,64645	10,84207	158,86371	16,62451	115,28600
3,62687	0,27572	17,98149	9,98107	10,88060	158,30121	16,68358	114,87780
3,63910	0,27479	18,37230	10,32193	10,91729	157,76911	16,73985	114,49166
3,65076	0,27392	18,75819	10,66902	10,95227	157,26526	16,79348	114,12602
3,66188	0,27308	19,13925	11,02235	10,98563	156,78770	16,84463	113,77946
3,67249	0,27229	19,51555	11,38193	11,01747	156,33463	16,89345	113,45067
3,68262	0,27155	19,88717	11,74774	11,04787	155,90440	16,94007	113,13845
3,69231	0,27083	20,25419	12,11979	11,07692	155,49550	16,98462	112,84172
3,70157	0,27016	20,61669	12,49809	11,10470	155,10654	17,02721	112,55946
3,71042	0,26951	20,97476	12,88262	11,13127	154,73625	17,06795	112,29074
3,71890	0,26890	21,32847	13,27340	11,15671	154,38346	17,10696	112,03472
3,72702	0,26831	21,67791	13,67042	11,18107	154,04707	17,14431	111,79061
3,73481	0,26775	22,02315	14,07369	11,20442	153,72609	17,18011	111,55768
3,74227	0,26722	22,36427	14,48320	11,22680	153,41959	17,21443	111,33525
3,74943	0,26671	22,70136	14,89895	11,24828	153,12671	17,24736	111,12271
3,75630	0,26622	23,03447	15,32095	11,26889	152,84665	17,27896	110,91948
3,76289	0,26575	23,36370	15,74919	11,28868	152,57868	17,30931	110,72501
3,76923	0,26531	23,68912	16,18367	11,30769	152,32212	17,33846	110,53883

EK Tablo 2 Devamı

2011					DOY	n2ref	DOY	n2ref	DOY	n2ref
					158,38129	3,90000	187,09234	7,00000	260,12199	7,60000
					n1	u1	n1	u1	n1	u1
Re1=1e13	Re1=1e13	Re1=1e13	Re1=1e13	Re1=1e13	2,90000	391,53470	4,50000	377,03403	3,90000	370,20320
M2/M1	Kappa	U2/U1	S2-S1	Cs2^2/Cs1^2	n2	u2	n2	u2	n2	u2
0,76312	1,22383	0,81711	0,02571	1,14650	3,54910	319,92604	5,50723	308,07743	4,77293	302,49590
0,70520	1,29730	0,77083	0,05550	1,19479	3,76216	301,80800	5,83784	290,63040	5,05946	285,36497
0,61033	1,44136	0,69379	0,15718	1,29218	4,17996	271,64168	6,48614	261,58130	5,62132	256,84216
0,53626	1,58065	0,63265	0,31681	1,39184	4,58387	247,70563	7,11290	238,53173	6,16452	234,21019
0,47712	1,71429	0,58333	0,53199	1,49479	4,97143	228,39524	7,71429	219,93652	6,68571	215,95187
0,42902	1,84173	0,54297	0,79777	1,60176	5,34101	212,59111	8,28777	204,71770	7,18273	201,00877
0,38927	1,96265	0,50952	1,10824	1,71325	5,69168	199,49303	8,83192	192,10471	7,65433	188,62430
0,35596	2,07692	0,48148	1,45739	1,82963	6,02308	188,51671	9,34615	181,53490	8,10000	178,24599
0,32771	2,18457	0,45776	1,83948	1,95119	6,33525	179,22745	9,83056	172,58968	8,51982	169,46282
0,30349	2,28571	0,43750	2,24924	2,07812	6,62857	171,29643	10,28571	164,95239	8,91429	161,96390
0,28253	2,38057	0,42007	2,68195	2,21061	6,90364	164,47121	10,71255	158,37994	9,28421	155,51053
0,26424	2,46939	0,40496	3,13341	2,34876	7,16122	158,55537	11,11224	152,68320	9,63061	149,91700
0,24815	2,55247	0,39178	3,59997	2,49268	7,40217	153,39427	11,48613	147,71324	9,95464	145,03708
0,23389	2,63014	0,38021	4,07845	2,64245	7,62740	148,86476	11,83562	143,35148	10,25753	140,75434
0,22119	2,70270	0,37000	4,56609	2,79812	7,83784	144,86784	12,16216	139,50259	10,54054	136,97518
0,20980	2,77049	0,36095	5,06053	2,95976	8,03443	141,32318	12,46721	136,08921	10,80492	133,62364
0,19954	2,83382	0,35288	5,55974	3,12740	8,21808	138,16502	12,75219	133,04802	11,05190	130,63755
0,19025	2,89299	0,34566	6,06199	3,30108	8,38967	135,33916	13,01845	130,32681	11,28266	127,96565
0,18180	2,94829	0,33918	6,56580	3,48083	8,55004	132,80056	13,26731	127,88223	11,49833	125,56535
0,17408	3,00000	0,33333	7,06992	3,66667	8,70000	130,51157	13,50000	125,67801	11,70000	123,40107
0,16700	3,04837	0,32804	7,57329	3,85861	8,84029	128,44049	13,71768	123,68364	11,88866	121,44283
0,16049	3,09366	0,32324	8,07502	4,05669	8,97160	126,56053	13,92145	121,87330	12,06526	119,66529
0,15448	3,13607	0,31887	8,57435	4,26091	9,09460	124,84887	14,11231	120,22504	12,23067	118,04689
0,14891	3,17582	0,31488	9,07066	4,47128	9,20989	123,28601	14,29121	118,72006	12,38571	116,56917
0,14374	3,21311	0,31122	9,56342	4,68782	9,31803	121,85519	14,45902	117,34222	12,53115	115,21630
0,13893	3,24812	0,30787	10,05221	4,91053	9,41955	120,54193	14,61654	116,07761	12,66767	113,97460
0,13444	3,28101	0,30478	10,53666	5,13943	9,51492	119,33371	14,76453	114,91413	12,79593	112,83220
0,13024	3,31193	0,30194	11,01648	5,37452	9,60459	118,21962	14,90367	113,84130	12,91651	111,77881
0,12630	3,34102	0,29931	11,49146	5,61580	9,68896	117,19012	15,03460	112,84993	13,02998	110,80540
0,12260	3,36842	0,29687	11,96141	5,86328	9,76842	116,23686	15,15789	111,93198	13,13684	109,90408
0,11912	3,39425	0,29462	12,42618	6,11697	9,84331	115,35250	15,27410	111,08037	13,23756	109,06790
0,11584	3,41860	0,29252	12,88568	6,37687	9,91395	114,53056	15,38372	110,28887	13,33256	108,29073
0,11273	3,44160	0,29056	13,33983	6,64298	9,98064	113,76529	15,48720	109,55194	13,42224	107,56716
0,10980	3,46333	0,28874	13,78858	6,91532	10,04365	113,05160	15,58497	108,86468	13,50698	106,89235
0,10702	3,48387	0,28704	14,23192	7,19387	10,10323	112,38496	15,67742	108,22273	13,58710	106,26203
0,10438	3,50331	0,28544	14,66983	7,47864	10,15960	111,76132	15,76490	107,62219	13,66291	105,67237
0,10187	3,52172	0,28395	15,10233	7,76964	10,21299	111,17707	15,84775	107,05957	13,73472	105,11994
0,09948	3,53917	0,28255	15,52944	8,06686	10,26359	110,62894	15,92627	106,53175	13,80276	104,60169
0,09721	3,55572	0,28124	15,95120	8,37032	10,31159	110,11404	16,00074	106,03591	13,86731	104,11483
0,09504	3,57143	0,28000	16,36765	8,68000	10,35714	109,62972	16,07143	105,56953	13,92857	103,65690
0,09297	3,58635	0,27884	16,77884	8,99592	10,40041	109,17360	16,13857	105,13031	13,98676	103,22563
0,09099	3,60053	0,27774	17,18483	9,31807	10,44154	108,74355	16,20240	104,71618	14,04208	102,81901
0,08909	3,61402	0,27670	17,58569	9,64645	10,48067	108,33761	16,26311	104,32528	14,09469	102,43519
0,08727	3,62687	0,27572	17,98149	9,98107	10,51791	107,95401	16,32090	103,95588	14,14478	102,07249
0,08553	3,63910	0,27479	18,37230	10,32193	10,55338	107,59115	16,37594	103,60646	14,19248	101,72939
0,08386	3,65076	0,27392	18,75819	10,66902	10,58719	107,24755	16,42841	103,27558	14,23795	101,40451
0,08225	3,66188	0,27308	19,13925	11,02235	10,61944	106,92187	16,47844	102,96197	14,28132	101,09658
0,08071	3,67249	0,27229	19,51555	11,38193	10,65022	106,61290	16,52620	102,66444	14,32271	100,80444
0,07923	3,68262	0,27155	19,88717	11,74774	10,67961	106,31950	16,57181	102,38191	14,36223	100,52703
0,07780	3,69231	0,27083	20,25419	12,11979	10,70769	106,04065	16,61538	102,11338	14,40000	100,26337
0,07642	3,70157	0,27016	20,61669	12,49809	10,73454	105,77540	16,65705	101,85796	14,43611	100,01257
0,07509	3,71042	0,26951	20,97476	12,88262	10,76023	105,52288	16,69691	101,61479	14,47066	99,77381
0,07381	3,71890	0,26890	21,32847	13,27340	10,78482	105,28229	16,73507	101,38311	14,50372	99,54633
0,07257	3,72702	0,26831	21,67791	13,67042	10,80837	105,05289	16,77161	101,16221	14,53540	99,32942
0,07137	3,73481	0,26775	22,02315	14,07369	10,83094	104,83399	16,80663	100,95142	14,56575	99,12245
0,07022	3,74227	0,26722	22,36427	14,48320	10,85258	104,62497	16,84021	100,75014	14,59485	98,92482
0,06910	3,74943	0,26671	22,70136	14,89895	10,87333	104,42524	16,87242	100,55781	14,62276	98,73597
0,06801	3,75630	0,26622	23,03447	15,32095	10,89326	104,23426	16,90333	100,37390	14,64955	98,55539
0,06697	3,76289	0,26575	23,36370	15,74919	10,91239	104,05152	16,93302	100,19792	14,67528	98,38261
0,06595	3,76923	0,26531	23,68912	16,18367	10,93077	103,87655	16,96154	100,02944	14,70000	98,21718

EK Tablo 2 Devamı

2012								DOY	n2ref	DOY	n2ref	DOY	n2ref	DOY	n2ref
								2,04070	7,40000	72,36222	34,70000	331,19209	4,50000	349,78554	12,20000
								n1	u1	n1	u1	n1	u1	n1	u1
			Re1=1e13	Re1=1e13	Re1=1e13	Re1=1e13	Re1=1e13	5,00000	358,10011	10,60000	431,70002	2,50000	440,08959	5,60000	326,33127
step	Mach	Re2/Re1	M2/M1	Kappa	U2/U1	S2-S1	Cs2^2/Cs1^2	n2	u2	n2	u2	n2	u2	n2	u2
1,00000	1,15000	1,77820	0,76312	1,22383	0,81711	0,02571	1,14650	6,11914	292,60638	12,97259	352,74543	3,05957	359,60062	6,85344	266,64781
2,00000	1,20000	1,70411	0,70520	1,29730	0,77083	0,05550	1,19479	6,48649	276,03550	13,75135	332,76877	3,24324	339,23573	7,26486	251,54702
3,00000	1,30000	1,57303	0,61033	1,44136	0,69379	0,15718	1,29218	7,20682	248,44520	15,27846	299,50786	3,60341	305,32843	8,07164	226,40439
4,00000	1,40000	1,46067	0,53626	1,58065	0,63265	0,31681	1,39184	7,90323	226,55313	16,75484	273,11634	3,95161	278,42403	8,85161	206,45448
5,00000	1,50000	1,36329	0,47712	1,71429	0,58333	0,53199	1,49479	8,57143	208,89173	18,17143	251,82501	4,28571	256,71893	9,60000	190,35991
6,00000	1,60000	1,27808	0,42902	1,84173	0,54297	0,79777	1,60176	9,20863	194,43717	19,52230	234,39962	4,60432	238,95490	10,31367	177,18768
7,00000	1,70000	1,20290	0,38927	1,96265	0,50952	1,10824	1,71325	9,81324	182,45758	20,80407	219,95788	4,90662	224,23250	10,99083	166,27087
8,00000	1,80000	1,13608	0,35596	2,07692	0,48148	1,45739	1,82963	10,38462	172,41857	22,01538	207,85557	5,19231	211,89499	11,63077	157,12246
9,00000	1,90000	1,07628	0,32771	2,18457	0,45776	1,83948	1,95119	10,92284	163,92256	23,15643	197,61338	5,46142	201,45375	12,23359	149,38017
10,00000	2,00000	1,02247	0,30349	2,28571	0,43750	2,24924	2,07812	11,42857	156,66880	24,22857	188,86876	5,71429	192,53920	12,80000	142,76993
11,00000	2,10000	0,97378	0,28253	2,38057	0,42007	2,68195	2,21061	11,90283	150,42641	25,23401	181,34338	5,95142	184,86757	13,33117	137,08133
12,00000	2,20000	0,92952	0,26424	2,46939	0,40496	3,13341	2,34876	12,34694	145,01575	26,17551	174,82067	6,17347	178,21810	13,82857	132,15068
13,00000	2,30000	0,88910	0,24815	2,55247	0,39178	3,59997	2,49268	12,76236	140,29537	27,05621	169,13011	6,38118	172,41695	14,29385	127,84907
14,00000	2,40000	0,85206	0,23389	2,63014	0,38021	4,07845	2,64245	13,15068	136,15265	27,87945	164,13595	6,57534	167,32573	14,72877	124,07387
15,00000	2,50000	0,81797	0,22119	2,70270	0,37000	4,56609	2,79812	13,51351	132,49704	28,64865	159,72901	6,75676	162,83315	15,13514	120,74257
16,00000	2,60000	0,78651	0,20980	2,77049	0,36095	5,06053	2,95976	13,85246	129,25507	29,36721	155,82072	6,92623	158,84891	15,51475	117,78821
17,00000	2,70000	0,75738	0,19954	2,83382	0,35288	5,55974	3,12740	14,16910	126,36660	30,03848	152,33859	7,08455	155,29911	15,86939	115,15599
18,00000	2,80000	0,73033	0,19025	2,89299	0,34566	6,06199	3,30108	14,46494	123,78205	30,66568	149,22284	7,23247	152,12281	16,20074	112,80073
19,00000	2,90000	0,70515	0,18180	2,94829	0,33918	6,56580	3,48083	14,74145	121,46023	31,25188	146,42382	7,37073	149,26939	16,51043	110,68489
20,00000	3,00000	0,68165	0,17408	3,00000	0,33333	7,06992	3,66667	15,00000	119,36670	31,80000	143,90001	7,50000	146,69653	16,80000	108,77709
21,00000	3,10000	0,65966	0,16700	3,04837	0,32804	7,57329	3,85861	15,24187	117,47249	32,31277	141,61647	7,62094	144,36862	17,07090	107,05092
22,00000	3,20000	0,63904	0,16049	3,09366	0,32324	8,07502	4,05669	15,46828	115,75306	32,79275	139,54366	7,73414	142,25552	17,32447	105,48403
23,00000	3,30000	0,61968	0,15448	3,13607	0,31887	8,57435	4,26091	15,68035	114,18757	33,24233	137,65641	7,84017	140,33160	17,56199	104,05742
24,00000	3,40000	0,60145	0,14891	3,17582	0,31488	9,07066	4,47128	15,87912	112,75817	33,66374	135,93323	7,93956	138,57492	17,78462	102,75483
25,00000	3,50000	0,58427	0,14374	3,21311	0,31122	9,56342	4,68782	16,06557	111,44952	34,05902	134,35562	8,03279	136,96666	17,99344	101,56228
26,00000	3,60000	0,56804	0,13893	3,24812	0,30787	10,05221	4,91053	16,24060	110,24841	34,43008	132,90765	8,12030	135,49055	18,18947	100,46773
27,00000	3,70000	0,55269	0,13444	3,28101	0,30478	10,53666	5,13943	16,40503	109,14337	34,77867	131,57548	8,20252	134,13249	18,37364	99,46072
28,00000	3,80000	0,53814	0,13024	3,31193	0,30194	11,01648	5,37452	16,55963	108,12441	35,10642	130,34710	8,27982	132,88024	18,54679	98,53216
29,00000	3,90000	0,52434	0,12630	3,34102	0,29931	11,49146	5,61580	16,70511	107,18282	35,41483	129,21199	8,35255	131,72307	18,70972	97,67410
30,00000	4,00000	0,51123	0,12260	3,36842	0,29687	11,96141	5,86328	16,84211	106,31097	35,70526	128,16094	8,42105	130,65160	18,86316	96,87960
31,00000	4,10000	0,49876	0,11912	3,39425	0,29462	12,42618	6,11697	16,97123	105,50213	35,97900	127,18586	8,48561	129,65757	19,00777	96,14251
32,00000	4,20000	0,48689	0,11584	3,41860	0,29252	12,88568	6,37687	17,09302	104,75037	36,23721	126,27960	8,54651	128,73369	19,14419	95,45745
33,00000	4,30000	0,47557	0,11273	3,44160	0,29056	13,33983	6,64298	17,20800	104,05045	36,48097	125,43582	8,60400	127,87352	19,27296	94,81962
34,00000	4,40000	0,46476	0,10980	3,46333	0,28874	13,78858	6,91532	17,31664	103,39771	36,71127	124,64892	8,65832	127,07132	19,39463	94,22478
35,00000	4,50000	0,45443	0,10702	3,48387	0,28704	14,23192	7,19387	17,41935	102,78800	36,92903	123,91390	8,70968	126,32201	19,50968	93,66916
36,00000	4,60000	0,44455	0,10438	3,50331	0,28544	14,66983	7,47864	17,51656	102,21761	37,13510	123,22628	8,75828	125,62104	19,61854	93,14938
37,00000	4,70000	0,43509	0,10187	3,52172	0,28395	15,10233	7,76964	17,60861	101,68325	37,33025	122,58209	8,80430	124,96433	19,72164	92,66242
38,00000	4,80000	0,42603	0,09948	3,53917	0,28255	15,52944	8,06686	17,69585	101,18193	37,51521	121,97774	8,84793	124,34823	19,81935	92,20558
39,00000	4,90000	0,41733	0,09721	3,55572	0,28124	15,95120	8,37032	17,77860	100,71100	37,69063	121,41001	8,88930	123,76947	19,91203	91,77642
40,00000	5,00000	0,40899	0,09504	3,57143	0,28000	16,36765	8,68000	17,85714	100,26803	37,85714	120,87601	8,92857	123,22509	20,00000	91,37276
41,00000	5,10000	0,40097	0,09297	3,58635	0,27884	16,77884	8,99592	17,93175	99,85087	38,01531	120,37310	8,96587	122,71241	20,08356	90,99260
42,00000	5,20000	0,39326	0,09099	3,60053	0,27774	17,18483	9,31807	18,00266	99,45754	38,16565	119,89893	9,00133	122,22903	20,16298	90,63417
43,00000	5,30000	0,38584	0,08909	3,61402	0,27670	17,58569	9,64645	18,07012	99,08626	38,30865	119,45135	9,03506	121,77274	20,23853	90,29583
44,00000	5,40000	0,37869	0,08727	3,62687	0,27572	17,98149	9,98107	18,13433	98,73542	38,44478	119,02840	9,06716	121,34158	20,31045	89,97611
45,00000	5,50000	0,37181	0,08553	3,63910	0,27479	18,37230	10,32193	18,19549	98,40354	38,57444	118,62831	9,09774	120,93371	20,37895	89,67368
46,00000	5,60000	0,36517	0,08386	3,65076	0,27392	18,75819	10,66902	18,25378	98,08928	38,69802	118,24946	9,12689	120,54750	20,44424	89,38730
47,00000	5,70000	0,35876	0,08225	3,66188	0,27308	19,13925	11,02235	18,30938	97,79142	38,81589	117,89038	9,15469	120,18144	20,50651	89,11586
48,00000	5,80000	0,35258	0,08071	3,67249	0,27229	19,51555	11,38193	18,36245	97,50883	38,92838	117,54971	9,18122	119,83415	20,56594	88,85834
49,00000	5,90000	0,34660	0,07923	3,68262	0,27155	19,88717	11,74774	18,41312	97,24049	39,03581	117,22621	9,20656	119,50436	20,62269	88,61380
50,00000	6,00000	0,34082	0,07780	3,69231	0,27083	20,25419	12,11979	18,46154	96,98545	39,13846	116,91876	9,23077	119,19093	20,67692	88,38139
51,00000	6,10000	0,33524	0,07642	3,70157	0,27016	20,61669	12,49809	18,50783	96,74285	39,23661	116,62630	9,25392	118,89279	20,72877	88,16031
52,00000	6,20000	0,32983	0,07509	3,71042	0,26951	20,97476	12,88262	18,55212	96,51189	39,33050	116,34787	9,27606	118,60895	20,77838	87,94984
53,00000	6,30000	0,32459	0,07381	3,71890	0,26890	21,32847	13,27340	18,59452	96,29185	39,42038	116,08260	9,29726	118,33853	20,82586	87,74932
54,00000	6,40000	0,31952	0,07257	3,72702	0,26831	21,67791	13,67042	18,63512	96,08204	39,50646	115,82967	9,31756	118,08068	20,87134	87,55812
55,00000	6,50000	0,31461	0,07137	3,73481	0,26775	22,02315	14,07369	18,67403	95,88183	39,58895	115,58832	9,33702	117,83464	20,91492	87,37568
56,00000	6,60000	0,30984	0,07022	3,74227	0,26722	22,36427	14,48320	18,71134	95,69066	39,66804	115,35786	9,35567	117,59970	20,95670	87,20147
57,00000	6,70000	0,30521	0,06910	3,74943	0,26671	22,70136	14,89895	18,74713	95,50799	39,74391	115,13764	9,37356	117,37520	20,99678	87,03500
58,00000	6,80000	0,30073	0,06801	3,75630	0,26622	23,03447	15,32095	18,78148	95,33331	39,81673	114,92706	9,39074	117,16053	21,03526	86,87582
59,00000	6,90000	0,29637	0,06697	3,76289	0,26575	23,36370	15,74919	18,81446	95,16618	39,88666	114,72557	9,40723	116,95513	21,07220	86,72351
60,00000	7,00000	0,29213	0,06595	3,76923	0,26531	23,68912	16,18367	18,84615	95,00615	39,95385	114,53266	9,42308	116,75846	21,10769	86,57768

EK Tablo 2 Devamı

2013								DOY	n2ref
								19,69868	13,90000
								n1	u1
			Re1=1e13	Re1=1e13	Re1=1e13	Re1=1e13	Re1=1e13	4,70000	384,48783
step	Mach	Re2/Re1	M2/M1	Kappa	U2/U1	S2-S1	Cs2^2/Cs1^2	n2	u2
1,00000	1,15000	1,77820	0,76312	1,22383	0,81711	0,02571	1,14650	5,75200	314,16798
2,00000	1,20000	1,70411	0,70520	1,29730	0,77083	0,05550	1,19479	6,09730	296,37603
3,00000	1,30000	1,57303	0,61033	1,44136	0,69379	0,15718	1,29218	6,77441	266,75265
4,00000	1,40000	1,46067	0,53626	1,58065	0,63265	0,31681	1,39184	7,42903	243,24740
5,00000	1,50000	1,36329	0,47712	1,71429	0,58333	0,53199	1,49479	8,05714	224,28457
6,00000	1,60000	1,27808	0,42902	1,84173	0,54297	0,79777	1,60176	8,65612	208,76488
7,00000	1,70000	1,20290	0,38927	1,96265	0,50952	1,10824	1,71325	9,22445	195,90254
8,00000	1,80000	1,13608	0,35596	2,07692	0,48148	1,45739	1,82963	9,76154	185,12377
9,00000	1,90000	1,07628	0,32771	2,18457	0,45776	1,83948	1,95119	10,26747	176,00170
10,00000	2,00000	1,02247	0,30349	2,28571	0,43750	2,24924	2,07812	10,74286	168,21342
11,00000	2,10000	0,97378	0,28253	2,38057	0,42007	2,68195	2,21061	11,18866	161,51104
12,00000	2,20000	0,92952	0,26424	2,46939	0,40496	3,13341	2,34876	11,60612	155,70168
13,00000	2,30000	0,88910	0,24815	2,55247	0,39178	3,59997	2,49268	11,99662	150,63346
14,00000	2,40000	0,85206	0,23389	2,63014	0,38021	4,07845	2,64245	12,36164	146,18548
15,00000	2,50000	0,81797	0,22119	2,70270	0,37000	4,56609	2,79812	12,70270	142,26050
16,00000	2,60000	0,78651	0,20980	2,77049	0,36095	5,06053	2,95976	13,02131	138,77963
17,00000	2,70000	0,75738	0,19954	2,83382	0,35288	5,55974	3,12740	13,31895	135,67832
18,00000	2,80000	0,73033	0,19025	2,89299	0,34566	6,06199	3,30108	13,59705	132,90332
19,00000	2,90000	0,70515	0,18180	2,94829	0,33918	6,56580	3,48083	13,85697	130,41041
20,00000	3,00000	0,68165	0,17408	3,00000	0,33333	7,06992	3,66667	14,10000	128,16261
21,00000	3,10000	0,65966	0,16700	3,04837	0,32804	7,57329	3,85861	14,32736	126,12881
22,00000	3,20000	0,63904	0,16049	3,09366	0,32324	8,07502	4,05669	14,54018	124,28269
23,00000	3,30000	0,61968	0,15448	3,13607	0,31887	8,57435	4,26091	14,73952	122,60184
24,00000	3,40000	0,60145	0,14891	3,17582	0,31488	9,07066	4,47128	14,92637	121,06710
25,00000	3,50000	0,58427	0,14374	3,21311	0,31122	9,56342	4,68782	15,10164	119,66203
26,00000	3,60000	0,56804	0,13893	3,24812	0,30787	10,05221	4,91053	15,26617	118,37241
27,00000	3,70000	0,55269	0,13444	3,28101	0,30478	10,53666	5,13943	15,42073	117,18594
28,00000	3,80000	0,53814	0,13024	3,31193	0,30194	11,01648	5,37452	15,56606	116,09189
29,00000	3,90000	0,52434	0,12630	3,34102	0,29931	11,49146	5,61580	15,70280	115,08092
30,00000	4,00000	0,51123	0,12260	3,36842	0,29687	11,96141	5,86328	15,83158	114,14482
31,00000	4,10000	0,49876	0,11912	3,39425	0,29462	12,42618	6,11697	15,95295	113,27638
32,00000	4,20000	0,48689	0,11584	3,41860	0,29252	12,88568	6,37687	16,06744	112,46923
33,00000	4,30000	0,47557	0,11273	3,44160	0,29056	13,33983	6,64298	16,17552	111,71773
34,00000	4,40000	0,46476	0,10980	3,46333	0,28874	13,78858	6,91532	16,27764	111,01689
35,00000	4,50000	0,45443	0,10702	3,48387	0,28704	14,23192	7,19387	16,37419	110,36225
36,00000	4,60000	0,44455	0,10438	3,50331	0,28544	14,66983	7,47864	16,46556	109,74983
37,00000	4,70000	0,43509	0,10187	3,52172	0,28395	15,10233	7,76964	16,55209	109,17609
38,00000	4,80000	0,42603	0,09948	3,53917	0,28255	15,52944	8,06686	16,63410	108,63784
39,00000	4,90000	0,41733	0,09721	3,55572	0,28124	15,95120	8,37032	16,71188	108,13220
40,00000	5,00000	0,40899	0,09504	3,57143	0,28000	16,36765	8,68000	16,78571	107,65659
41,00000	5,10000	0,40097	0,09297	3,58635	0,27884	16,77884	8,99592	16,85584	107,20869
42,00000	5,20000	0,39326	0,09099	3,60053	0,27774	17,18483	9,31807	16,92250	106,78638
43,00000	5,30000	0,38584	0,08909	3,61402	0,27670	17,58569	9,64645	16,98591	106,38774
44,00000	5,40000	0,37869	0,08727	3,62687	0,27572	17,98149	9,98107	17,04627	106,01105
45,00000	5,50000	0,37181	0,08553	3,63910	0,27479	18,37230	10,32193	17,10376	105,65471
46,00000	5,60000	0,36517	0,08386	3,65076	0,27392	18,75819	10,66902	17,15856	105,31730
47,00000	5,70000	0,35876	0,08225	3,66188	0,27308	19,13925	11,02235	17,21082	104,99748
48,00000	5,80000	0,35258	0,08071	3,67249	0,27229	19,51555	11,38193	17,26070	104,69407
49,00000	5,90000	0,34660	0,07923	3,68262	0,27155	19,88717	11,74774	17,30833	104,40595
50,00000	6,00000	0,34082	0,07780	3,69231	0,27083	20,25419	12,11979	17,35385	104,13212
51,00000	6,10000	0,33524	0,07642	3,70157	0,27016	20,61669	12,49809	17,39736	103,87164
52,00000	6,20000	0,32983	0,07509	3,71042	0,26951	20,97476	12,88262	17,43900	103,62367
53,00000	6,30000	0,32459	0,07381	3,71890	0,26890	21,32847	13,27340	17,47885	103,38741
54,00000	6,40000	0,31952	0,07257	3,72702	0,26831	21,67791	13,67042	17,51702	103,16214
55,00000	6,50000	0,31461	0,07137	3,73481	0,26775	22,02315	14,07369	17,55359	102,94718
56,00000	6,60000	0,30984	0,07022	3,74227	0,26722	22,36427	14,48320	17,58866	102,74193
57,00000	6,70000	0,30521	0,06910	3,74943	0,26671	22,70136	14,89895	17,62230	102,54579
58,00000	6,80000	0,30073	0,06801	3,75630	0,26622	23,03447	15,32095	17,65459	102,35824
59,00000	6,90000	0,29637	0,06697	3,76289	0,26575	23,36370	15,74919	17,68560	102,17879
60,00000	7,00000	0,29213	0,06595	3,76923	0,26531	23,68912	16,18367	17,71538	102,00697

EK Tablo 2 Devamı

2014								DOY	n2ref	DOY	n2ref	DOY	n2ref	DOY	n2ref	DOY	n2ref	DOY	n2ref
								7,60098	10,50000	9,81325	5,80000	50,13053	35,20000	58,67199	3,40000	109,74523	8,70000	127,89779	8,80000
								n1	u1	n1	u1	n1	u1	n1	u1	n1	u1	n1	u1
			Re1=1e13	Re1=1e13	Re1=1e13	Re1=1e13	Re1=1e13	4,10000	347,75690	2,90000	390,97578	15,50000	353,69244	1,80000	382,96320	5,80000	475,44105	3,90000	330,43270
step	Mach	Re2/Re1	M2/M1	Kappa	U2/U1	S2-S1	Cs2^2/Cs1^2	n2	u2	n2	u2	n2	u2	n2	u2	n2	u2	n2	u2
1,00000	1,15000	1,77820	0,76312	1,22383	0,81711	0,02571	1,14650	5,01770	284,15486	3,54910	319,46934	18,96935	289,00483	2,20289	312,92220	7,09821	388,48657	4,77293	269,99912
2,00000	1,20000	1,70411	0,70520	1,29730	0,77083	0,05550	1,19479	5,31892	268,06261	3,76216	301,37716	20,10811	272,63792	2,33514	295,20080	7,52432	366,48581	5,05946	254,70854
3,00000	1,30000	1,57303	0,61033	1,44136	0,69379	0,15718	1,29218	5,90959	241,26921	4,17996	271,25391	22,34115	245,38721	2,59446	265,69488	8,35991	329,85481	5,62132	229,24991
4,00000	1,40000	1,46067	0,53626	1,58065	0,63265	0,31681	1,39184	6,48065	220,00947	4,58387	247,35202	24,50000	223,76460	2,84516	242,28284	9,16774	300,78923	6,16452	209,04926
5,00000	1,50000	1,36329	0,47712	1,71429	0,58333	0,53199	1,49479	7,02857	202,85819	4,97143	228,06920	26,57143	206,32059	3,08571	223,39520	9,94286	277,34061	6,68571	192,75241
6,00000	1,60000	1,27808	0,42902	1,84173	0,54297	0,79777	1,60176	7,55108	188,82113	5,34101	212,28763	28,54676	192,04394	3,31511	207,93705	10,68201	258,14963	7,18273	179,41463
7,00000	1,70000	1,20290	0,38927	1,96265	0,50952	1,10824	1,71325	8,04686	177,18755	5,69168	199,20825	30,42105	180,21180	3,53277	195,12571	11,38336	242,24462	7,65433	168,36061
8,00000	1,80000	1,13608	0,35596	2,07692	0,48148	1,45739	1,82963	8,51538	167,43851	6,02308	188,24760	32,19231	170,29636	3,73846	184,38969	12,04615	228,91606	8,10000	159,09723
9,00000	1,90000	1,07628	0,32771	2,18457	0,45776	1,83948	1,95119	8,95673	159,18789	6,33525	178,97160	33,86082	161,90492	3,93222	175,30379	12,67050	217,63610	8,51982	151,25763
10,00000	2,00000	1,02247	0,30349	2,28571	0,43750	2,24924	2,07812	9,37143	152,14364	6,62857	171,05190	35,42857	154,74044	4,11429	167,54640	13,25714	208,00546	8,91429	144,56431
11,00000	2,10000	0,97378	0,28253	2,38057	0,42007	2,68195	2,21061	9,76032	146,08155	6,90364	164,23642	36,89879	148,57488	4,28502	160,87059	13,80729	199,71758	9,28421	138,80421
12,00000	2,20000	0,92952	0,26424	2,46939	0,40496	3,13341	2,34876	10,12449	140,82717	7,16122	158,32903	38,27551	143,23082	4,44490	155,08427	14,32245	192,53398	9,63061	133,81159
13,00000	2,30000	0,88910	0,24815	2,55247	0,39178	3,59997	2,49268	10,46514	136,24313	7,40217	153,17529	39,56333	138,56854	4,59445	150,03615	14,80434	186,26684	9,95464	129,45591
14,00000	2,40000	0,85206	0,23389	2,63014	0,38021	4,07845	2,64245	10,78356	132,22007	7,62740	148,65225	40,76712	134,47681	4,73425	145,60580	15,25479	180,76665	10,25753	125,63327
15,00000	2,50000	0,81797	0,22119	2,70270	0,37000	4,56609	2,79812	11,08108	128,67005	7,83784	144,66104	41,89189	130,86620	4,86486	141,69638	15,67568	175,91319	10,54054	122,26010
16,00000	2,60000	0,78651	0,20980	2,77049	0,36095	5,06053	2,95976	11,35902	125,52172	8,03443	141,12144	42,94262	127,66413	4,98689	138,22932	16,06885	171,60890	10,80492	119,26861
17,00000	2,70000	0,75738	0,19954	2,83382	0,35288	5,55974	3,12740	11,61866	122,71668	8,21808	137,96779	43,92420	124,81122	5,10087	135,14030	16,43615	167,77395	11,05190	116,60331
18,00000	2,80000	0,73033	0,19025	2,89299	0,34566	6,06199	3,30108	11,86125	120,20678	8,38967	135,14596	44,84133	122,25848	5,20738	132,37631	16,77934	164,34251	11,28266	114,21845
19,00000	2,90000	0,70515	0,18180	2,94829	0,33918	6,56580	3,48083	12,08799	117,95203	8,55004	132,61099	45,69851	119,96524	5,30692	129,89328	17,10009	161,25988	11,49833	112,07601
20,00000	3,00000	0,68165	0,17408	3,00000	0,33333	7,06992	3,66667	12,30000	115,91897	8,70000	130,32526	46,50000	117,89748	5,40000	127,65440	17,40000	158,48035	11,70000	110,14423
21,00000	3,10000	0,65966	0,16700	3,04837	0,32804	7,57329	3,85861	12,49833	114,07946	8,84029	128,25714	47,24980	116,02658	5,48707	125,62867	17,68057	155,96544	11,88866	108,39637
22,00000	3,20000	0,63904	0,16049	3,09366	0,32324	8,07502	4,05669	12,68399	112,40970	8,97160	126,37987	47,95166	114,32832	5,56858	123,78986	17,94320	153,68260	12,06526	106,80979
23,00000	3,30000	0,61968	0,15448	3,13607	0,31887	8,57435	4,26091	12,85788	110,88942	9,09460	124,67065	48,60907	112,78209	5,64492	122,11567	18,18920	151,60414	12,23067	105,36525
24,00000	3,40000	0,60145	0,14891	3,17582	0,31488	9,07066	4,47128	13,02088	109,50131	9,20989	123,11002	49,22527	111,37028	5,71648	120,58703	18,41978	149,70635	12,38571	104,04628
25,00000	3,50000	0,58427	0,14374	3,21311	0,31122	9,56342	4,68782	13,17377	108,23046	9,31803	121,68124	49,80328	110,07775	5,78361	119,18753	18,63607	147,96890	12,53115	102,83875
26,00000	3,60000	0,56804	0,13893	3,24812	0,30787	10,05221	4,91053	13,31729	107,06404	9,41955	120,36986	50,34586	108,89142	5,84662	117,90302	18,83910	146,37421	12,66767	101,73044
27,00000	3,70000	0,55269	0,13444	3,28101	0,30478	10,53666	5,13943	13,45213	105,99092	9,51492	119,16336	50,85560	107,79998	5,90581	116,72125	19,02984	144,90707	12,79593	100,71077
28,00000	3,80000	0,53814	0,13024	3,31193	0,30194	11,01648	5,37452	13,57890	105,00139	9,60459	118,05086	51,33486	106,79356	5,96147	115,63155	19,20917	143,55422	12,91651	99,77054
29,00000	3,90000	0,52434	0,12630	3,34102	0,29931	11,49146	5,61580	13,69819	104,08700	9,68896	117,02283	51,78583	105,86356	6,01384	114,62459	19,37792	142,30410	13,02998	98,90170
30,00000	4,00000	0,51123	0,12260	3,36842	0,29687	11,96141	5,86328	13,81053	103,24033	9,76842	116,07093	52,21053	105,00244	6,06316	113,69220	19,53684	141,14656	13,13684	98,09721
31,00000	4,10000	0,49876	0,11912	3,39425	0,29462	12,42618	6,11697	13,91641	102,45485	9,84331	115,18784	52,61080	104,20356	6,10964	112,82720	19,68662	140,07268	13,23756	97,35086
32,00000	4,20000	0,48689	0,11584	3,41860	0,29252	12,88568	6,37687	14,01628	101,72481	9,91395	114,36706	52,98837	103,46105	6,15349	112,02325	19,82791	139,07459	13,33256	96,65718
33,00000	4,30000	0,47557	0,11273	3,44160	0,29056	13,33983	6,64298	14,11056	101,04510	9,98064	113,60289	53,34481	102,76975	6,19488	111,27473	19,96128	138,14532	13,42224	96,01134
34,00000	4,40000	0,46476	0,10980	3,46333	0,28874	13,78858	6,91532	14,19964	100,41121	10,04365	112,89022	53,68157	102,12504	6,23399	110,57667	20,08730	137,27869	13,50698	95,40903
35,00000	4,50000	0,45443	0,10702	3,48387	0,28704	14,23192	7,19387	14,28387	99,81911	10,10323	112,22453	54,00000	101,52283	6,27097	109,92462	20,20645	136,46919	13,58710	94,84642
36,00000	4,60000	0,44455	0,10438	3,50331	0,28544	14,66983	7,47864	14,36358	99,26520	10,15960	111,60178	54,30132	100,95947	6,30596	109,31464	20,31921	135,71191	13,66291	94,32011
37,00000	4,70000	0,43509	0,10187	3,52172	0,28395	15,10233	7,76964	14,43906	98,74627	10,21299	111,01836	54,58669	100,43168	6,33910	108,74317	20,42599	135,00244	13,73472	93,82703
38,00000	4,80000	0,42603	0,09948	3,53917	0,28255	15,52944	8,06686	14,51060	98,25944	10,26359	110,47102	54,85714	99,93653	6,37051	108,20705	20,52719	134,33686	13,80276	93,36445
39,00000	4,90000	0,41733	0,09721	3,55572	0,28124	15,95120	8,37032	14,57845	97,80210	10,31159	109,95685	55,11366	99,47139	6,40030	107,70341	20,62318	133,71161	13,86731	92,92990
40,00000	5,00000	0,40899	0,09504	3,57143	0,28000	16,36765	8,68000	14,64286	97,37193	10,35714	109,47322	55,35714	99,03388	6,42857	107,22970	20,71429	133,12349	13,92857	92,52116
41,00000	5,10000	0,40097	0,09297	3,58635	0,27884	16,77884	8,99592	14,70403	96,96682	10,40041	109,01776	55,58842	98,62185	6,45543	106,78357	20,80083	132,56963	13,98676	92,13622
42,00000	5,20000	0,39326	0,09099	3,60053	0,27774	17,18483	9,31807	14,76218	96,58485	10,44154	108,58832	55,80826	98,23337	6,48096	106,36293	20,88309	132,04742	14,04208	91,77328
43,00000	5,30000	0,38584	0,08909	3,61402	0,27670	17,58569	9,64645	14,81750	96,22430	10,48067	108,18296	56,01737	97,86666	6,50524	105,96588	20,96134	131,55449	14,09469	91,43069
44,00000	5,40000	0,37869	0,08727	3,62687	0,27572	17,98149	9,98107	14,87015	95,88359	10,51791	107,79991	56,21642	97,52014	6,52836	105,59068	21,03582	131,08868	14,14478	91,10696
45,00000	5,50000	0,37181	0,08553	3,63910	0,27479	18,37230	10,32193	14,92030	95,56130	10,55338	107,43756	56,40602	97,19234	6,55038	105,23575	21,10677	130,64806	14,19248	90,80072
46,00000	5,60000	0,36517	0,08386	3,65076	0,27392	18,75819	10,66902	14,96810	95,25611	10,58719	107,09445	56,58673	96,88195	6,57136	104,89968	21,17439	130,23082	14,23795	90,51074
47,00000	5,70000	0,35876	0,08225	3,66188	0,27308	19,13925	11,02235	15,01369	94,96685	10,61944	106,76924	56,75909	96,58775	6,59138	104,58113	21,23888	129,83536	14,28132	90,23589
48,00000	5,80000	0,35258	0,08071	3,67249	0,27229	19,51555	11,38193	15,05721	94,69243	10,65022	106,46071	56,92358	96,30864	6,61048	104,27892	21,30044	129,46017	14,32271	89,97514
49,00000	5,90000	0,34660	0,07923	3,68262	0,27155	19,88717	11,74774	15,09876	94,43183	10,67961	106,16773	57,08067	96,04360	6,62872	103,99195	21,35922	129,10389	14,36223	89,72752
50,00000	6,00000	0,34082	0,07780	3,69231	0,27083	20,25419	12,11979	15,13846	94,18416	10,70769	105,88927	57,23077	95,79170	6,64615	103,71920	21,41538	128,76528	14,40000	89,49219
51,00000	6,10000	0,33524	0,07642	3,70157	0,27016	20,61669	12,49809	15,17642	93,94857	10,73454	105,62440	57,37429	95,55209	6,66282	103,45976	21,46909	128,44319	14,43611	89,26833
52,00000	6,20000	0,32983	0,07509	3,71042	0,26951	20,97476	12,88262	15,21274	93,72428	10,76023	105,37224	57,51158	95,32398	6,67876	103,21277	21,52046	128,13656	14,47066	89,05522
53,00000	6,30000	0,32459	0,07381	3,71890	0,26890	21,32847	13,27340	15,24751	93,51059	10,78482	105,13200	57,64301	95,10664	6,69403	102,97744	21,56964	127,84441	14,50372	88,85218
54,00000	6,40000	0,31952	0,07257	3,72702	0,26831	21,67791	13,67042	15,28080	93,30684	10,80837	104,90293	57,76888	94,89941	6,70864	102,75306	21,61674	127,56585	14,53540	88,65858
55,00000	6,50000	0,31461	0,07137	3,73481	0,26775	22,02315	14,07369	15,31271	93,11242	10,83094	104,68434	57,88950	94,70167	6,72265	102,53896	21,66188	127,30004	14,56575	88,47384
56,00000	6,60000	0,30984	0,07022	3,74227	0,26722	22,36427	14,48320	15,34330	92,92677	10,85258	104,47562	58,00515	94,51286	6,73608	102,33452	21,70515	127,04623	14,59485	88,29744
57,00000	6,70000	0,30521	0,06910	3,74943	0,26671	22,70136	14,89895	15,37265	92,74938	10,87333	104,27618	58,11610	94,33243	6,74897	102,13916	21,74667	126,80370	14,62276	88,12888
58,00000	6,80000	0,30073	0,06801	3,75630	0,26622	23,03447	15,32095	15,40081	92,57975	10,89326	104,08546	58,22258	94,15990	6,76133	101,95236	21,78652	126,57178	14,64955	87,96770
59,00000	6,90000	0,29637	0,06697	3,76289	0,26575	23,36370	15,74919	15,42786	92,41744	10,91239	103,90298	58,32484	93,99482	6,77321	101,77362	21,82478	126,34988	14,67528	87,81348
60,00000	7,00000	0,29213	0,06595	3,76923	0,26531	23,68912	16,18367	15,45385	92,26203	10,93077	103,72827	58,42308	93,83677	6,78462	101,60248	21,86154	126,13742	14,70000	87,66582

EK 3. Parametreler

EK Tablo 3

1998

DOY	49,328484	63,456991	113,72803	120,36358	121,89061	123,70857	128,38986	135,58152	149,62742	164,78869	176,65498	186,13609	212,385498
Mach	1,33	1,64	4,65	5000	2,84	3,07	1,5	5,96	1,58	5000	1,5	1,47	1,43
Re2/Re1	1,4984812	1,2352421	0,4399236	0	0,7156641	0,6754114	1,3632901	0,3443372	1,3490537	0	1,3632901	1,4348629	1,395818982
M2/M1	0,5669286	0,4076363	0,1031493	0	0,1855021	0,1717616	0,4771187	0,0786541	0,4631106	0	0,4771187	0,5153221	0,501299751
M2	0,7624793	0,6709944	0,4795262	0	0,5283078	0,5235539	0,7156781	0,4679229	0,7158487	0	0,7156781	0,7448298	0,724562311
Kappa	1,4881199	1,8905742	3,5128237	0	2,9108046	3,044437	1,7142857	3,6938832	1,8122097	0	1,7142857	1,6698387	1,624400922
U2/U1	0,6554089	0,5240378	0,2847391	0	0,3413817	0,3329901	0,5833333	0,2716674	0,575313	0	0,5833333	0,6179762	0,601160512
S2-S1	0,2308858	0,9434185	14,88548	0	6,289271	7,3674442	0,531993	20,104285	0,6740808	0	0,531993	0,4270018	0,415382699
Cs2^2/Cs1^2	1,3221213	1,6472902	7,6234549	0	3,3785277	3,7867474	1,4947917	11,9531	1,5781249	0	1,4947917	1,4631622	1,423348265
n2	32,14339	8,3185265	41,100037	0	15,427264	12,786635	9,7714286	34,722502	15,766224	0	22,457143	10,186016	10,07128571
u2	247,65879	184,60526	92,085381	0	169,94894	142,93963	311,22959	83,57438	303,18872	0	231,03724	274,14072	247,0112874
Shock Class	vW	W	S	VS	M	S	W	VS	W	VS	W	W	W
Strength Number	1	2	4	5	3	4	2	5	2	5	2	2	2
Strength	0,9977	2,1338	25,7781	0	8,8683	10,4527	1,5625	43,0771	1,8061	0	1,5625	1,4106	1,345
P2/P1	1,9977	3,1338	26,7781	0	9,8683	11,4527	2,5625	44,0771	2,8061	0	2,5625	2,4106	2,345

1998 Devamı

DOY	218,28067	222,00456	227,49862	238,26453	267,96764	275,28689	291,79223	296,52352	311,31701	312,18146	316,27182	355,9514	362,731759
Mach	1,99	1,75	1,73	3,34	1,84	1,85	2,26	2,26	1,57	1,94	1,49	1,41	1,3
Re2/Re1	1,0723094	1,1714	1,1580126	0,6090131	1,1018075	1,1077956	0,914253	0,914253	1,3405154	1,0453669	1,4543848	1,376297	1,573027082
M2/M1	0,3226002	0,3733928	0,3691255	0,1513164	0,3406127	0,3424638	0,2576357	0,2576357	0,4601795	0,3144947	0,5223333	0,4942886	0,610330302
M2	0,6280389	0,6520713	0,6446191	0,5066581	0,6289707	0,632389	0,5789901	0,5789901	0,711318	0,6122591	0,7549635	0,7144286	0,793429393
Kappa	2,2811671	2,0198021	1,9967187	3,1469311	2,1193297	2,1308478	2,5224084	2,5224084	1,80074	2,2238513	1,6925576	1,601682	1,441364606
U2/U1	0,457376	0,4963042	0,4906321	0,3160289	0,4677409	0,470283	0,4004832	0,4004832	0,5716718	0,4458841	0,626384	0,5927527	0,693786982
S2-S1	2,0823047	1,2788703	1,2642547	8,7944384	1,6355832	1,6444722	3,378118	3,378118	0,6698145	2,0299855	0,4328113	0,4095732	0,157175129
Cs2^2/Cs1^2	2,0556725	1,7712211	1,7509786	4,352465	1,8799288	1,8901458	2,4310736	2,4310736	1,5681367	2,0040224	1,4830692	1,4034413	1,292178254
n2	27,602121	9,6950503	5,5908123	15,419963	20,981364	7,8841368	44,898869	9,0806701	10,984514	11,786412	9,4783226	20,341362	14,84605544
u2	169,44655	200,00711	183,69598	142,53643	204,25985	237,94166	128,17671	197,06378	238,54538	204,18916	215,9431	212,83247	266,1281043
Shock Class	W	W	W	S	W	W	M	M	W	W	W	W	vW
Strength Number	2	2	2	4	2	2	3	3	2	2	2	2	1
Strength	3,5953	2,5779	2,537	12,7369	3,0062	3,0279	5,105	5,105	1,7884	3,4799	1,4434	1,3122	0,8625
P2/P1	4,5953	3,5779	3,537	13,7369	4,0062	4,0279	6,105	6,105	2,7884	4,4799	2,4434	2,3122	1,8625

EK Tablo 3 Devamı

1999

DOY	42,325405	48,266505	49,089468	69,027951	106,44142	125,62454	138,00249	207,98127	216,05274	220,73941
Mach	1,71	1,4	2,53	1,38	1,71	3,26	4,05	1,29	4,16	1,45
Re2/Re1	1,1446252	1,460668	0,796564	1,554815	1,1446252	0,6315952	0,5051532	1,696424	0,494158	1,4153409
M2/M1	0,3648582	0,5362551	0,2140008	0,5882417	0,3648582	0,1580507	0,1209023	0,6818646	0,117799	0,5083109
M2	0,6371668	0,7507572	0,5452097	0,791144	0,6371668	0,5133924	0,4894925	0,8485192	0,4887128	0,734696
Kappa	1,9736352	1,5806452	2,7155184	1,5440642	1,9736352	3,1248589	3,3816892	1,4124359	3,4149819	1,6471198
U2/U1	0,4849601	0,6326531	0,3628345	0,6800484	0,4849601	0,3221542	0,2958047	0,758548	0,2943294	0,6095684
S2-S1	1,249639	0,3168099	4,7725845	0,2395658	1,249639	8,3484248	12,192782	0,1078124	12,685491	0,4211922
Cs2^2/Cs1^2	1,7307361	1,3918367	2,8558899	1,3718251	1,7307361	4,1710062	5,989473	1,2833197	6,2613131	1,4432552
n2	24,67044	12,170968	10,590522	15,903862	9,2760856	14,999323	28,06802	3,8135769	19,806895	2,8001037
u2	181,8326	291,41409	144,80898	280,14628	182,36045	122,15632	101,10607	301,40283	96,995454	226,12907
Shock Class	W	W	M	W	W	S	S	vW	S	W
Strength Number	2	2	3	2	2	4	4	1	4	2
Strength	2,4961	1,2	6,8162	1,0728	2,4961	11,9929	19,2531	0,7572	20,3294	1,3778
P2/P1	3,4961	2,2	7,8162	2,0728	3,4961	12,9929	20,2531	1,7572	21,3294	2,3778

1999 Devamı

DOY	227,40199	234,95068	235,4792	294,06763	301,47688	317,50907	323,99906	345,50145	346,63515	360,89402
Mach	2,45	1,5	1,15	2,97	1,5	1,81	1,34	1,28	1,96	1,56
Re2/Re1	0,8357111	1,3632901	1,7782045	0,6984998	1,3632901	1,0838433	1,5097479	1,6832734	1,0561439	1,3319771
M2/M1	0,227767	0,4771187	0,7631176	0,1792614	0,4771187	0,3350592	0,5711912	0,6765788	0,3177369	0,4572484
M2	0,5574791	0,7156781	0,8775853	0,5284748	0,7156781	0,6187157	0,7682122	0,8419416	0,618571	0,7067873
Kappa	2,6667901	1,7142857	1,2238288	2,9947283	1,7142857	2,0847754	1,4993088	1,4014868	2,2467776	1,7892703
U2/U1	0,3753647	0,5833333	0,8171078	0,3386833	0,5833333	0,4601147	0,6603368	0,7526678	0,4504808	0,5680306
S2-S1	4,3190938	0,531993	0,025709	6,8617525	0,531993	1,6089161	0,2326218	0,1069766	2,0509132	0,6655482
Cs2^2/Cs1^2	2,7198307	1,4947917	1,1465043	3,5974251	1,4947917	1,8492778	1,3320621	1,2733715	2,0246824	1,5581486
n2	32,534839	4,2857143	8,8115674	31,145174	9,7714286	7,0882364	6,8968203	4,4847577	1,7974221	6,6203001
u2	124,84973	240,80402	315,48949	116,94159	218,99404	186,30125	293,5786	331,40935	163,46232	210,31861
Shock Class	M	W	vW	M	W	W	vW	vW	W	W
Strength Number	3	2	1	3	2	2	1	1	2	2
Strength	6,253	1,5625	0,403125	9,7001	1,5625	2,9409	1,0128	0,7436	3,5261	1,7706
P2/P1	7,253	2,5625	1,403125	10,7001	2,5625	3,9409	2,0128	1,7436	4,5261	2,7706

EK Tablo 3 Devamı

2000

DOY	11,569745	22,015648	27,581019	30,781204	36,617488	42,092303	42,971377	45,289699	115,36942	155,33622	156,59936	160,36194
Mach	1,46	1,63	1,79	1,25	1,77	2,48	5,05	1,39	1,32	1,29	1,63	3,65
Re2/Re1	1,4251019	1,2277102	1,1981749	1,6438217	1,1847874	0,8459443	0,4050568	1,5660818	1,4872144	1,696424	1,2277102	0,5605717
M2/M1	0,5118165	0,4051507	0,3819275	0,6607215	0,3776602	0,230556	0,0940216	0,5925043	0,562666	0,6818646	0,4051507	0,1367437
M2	0,7397629	0,666903	0,6669758	0,8222086	0,6595236	0,5643054	0,4747109	0,7968769	0,7567464	0,8485192	0,666903	0,4989086
Kappa	1,6584793	1,8790463	2,065969	1,3686394	2,0428856	2,6994447	3,5791661	1,5552531	1,476931	1,4124359	1,8790463	3,2649509
U2/U1	0,6137723	0,5208425	0,5076483	0,7350271	0,5019762	0,379961	0,2794507	0,6849762	0,650481	0,758548	0,5208425	0,3064061
S2-S1	0,424097	0,9376659	1,3081016	0,1044693	1,293486	4,3719807	16,572831	0,2413017	0,2291499	0,1078124	0,9376659	10,293044
Cs2^2/Cs1^2	1,4532087	1,6372457	1,8117062	1,2435269	1,7914637	2,7531348	8,8372605	1,3817659	1,3121806	1,2833197	1,6372457	5,0243557
n2	20,565143	12,96542	85,737715	5,2008298	13,278756	8,9081673	19,685413	5,5989112	7,6800413	15,536795	4,8855204	12,406813
u2	259,73962	172,78851	168,86216	449,0302	188,21858	157,80829	121,21118	392,89286	306,00326	290,32189	212,28646	156,32863
Shock Class	W	W	W	vW	W	M	VS	W	vW	vW	W	S
Strength Number	2	2	2	1	2	3	5	2	1	1	2	4
Strength	1,3942	2,1147	2,6597	0,7027	2,6188	6,3418	30,6281	1,0879	0,9827	0,7572	2,1147	15,4031
P2/P1	2,3942	3,1147	3,6597	1,7027	3,6188	7,3418	31,6281	2,0879	1,9827	1,7572	3,1147	16,4031

2000 Devamı

DOY	163,30361	175,5186	192,24858	193,47413	195,37653	195,38819	201,61707	208,74652	210,3817	224,7576	248,53052	250,67589	261,706424
Mach	1,19	2,29	1,73	1,68	1,89	1,72	3,45	1,77	1,57	1,82	1,82	2,98	1,26
Re2/Re1	1,7649834	0,9263891	1,1580126	1,26537	1,131748	1,1513189	0,5931085	1,1847874	1,3405154	1,0898314	1,0898314	0,7008516	1,656972277
M2/M1	0,7444938	0,2610557	0,3691255	0,4175786	0,3498684	0,3669918	0,1463956	0,3776602	0,4601795	0,3369104	0,3369104	0,1798649	0,666007236
M2	0,873651	0,5866758	0,6446191	0,6873601	0,6460623	0,640893	0,5048296	0,6595236	0,711318	0,622134	0,622134	0,5302542	0,828786229
Kappa	1,2764416	2,5558917	1,9967187	1,9366858	2,1769202	1,985177	3,1948703	2,0428856	1,80074	2,0962935	2,0962935	3,0048116	1,379588544
U2/U1	0,8049693	0,4057994	0,4906321	0,5368192	0,4804513	0,4877961	0,3131439	0,5019762	0,5716718	0,4626568	0,4626568	0,3398237	0,740907345
S2-S1	0,0408186	3,4229603	1,2642547	0,9664287	1,6800284	1,2569468	9,3154288	1,293486	0,6698145	1,6178051	1,6178051	6,8848561	0,105305087
Cs2^2/Cs1^2	1,1856089	2,4633445	1,7509786	1,687468	1,9310138	1,7408574	4,5789422	1,7914637	1,5681367	1,8594948	1,8594948	3,6095376	1,253475087
n2	4,0846132	17,635652	13,577687	38,346378	10,013833	19,653252	9,9040979	23,288896	34,934356	4,4022163	10,481467	28,54571	14,07180315
u2	371,39408	162,68473	197,90425	221,73825	243,9677	293,47109	148,71979	178,97507	222,63382	188,49786	206,90192	132,44028	439,1726398
Shock Class	vW	M	W	W	W	W	S	W	W	W	W	M	vW
Strength Number	1	3	2	2	2	2	4	2	2	2	2	3	1
Strength	0,4945	5,1861	2,537	2,2102	3,115	2,5166	13,6281	2,6188	1,7884	2,9626	2,9626	9,7361	0,7163
P2/P1	1,4945	6,1861	3,537	3,2102	4,115	3,5166	14,6281	3,6188	2,7884	3,9626	3,9626	10,7361	1,7163

EK Tablo 3 Devamı

2000 Devamı

DOY	274,44326	277,00585	279,11122	302,38064	305,68765	309,066	311,38524	316,16747	331,20836	331,47502	333,20651	334,12984	338,139456
Mach	1,21	2,13	2,13	2,96	2,84	5,75	2,15	2,18	1,55	2,23	1,51	1,64	1,37
Re2/Re1	1,5912194	0,9438151	0,9438151	0,6961479	0,7156641	0,3557216	0,9526773	0,9659704	1,3234388	0,9021169	1,2892855	1,2352421	1,543548258
M2/M1	0,6395784	0,2711969	0,2711969	0,1786578	0,1855021	0,0814955	0,2737433	0,277563	0,4543174	0,2542158	0,442593	0,4076363	0,583979099
M2	0,7958979	0,5823048	0,5823048	0,5266954	0,5283078	0,4685249	0,5877725	0,5959739	0,7022566	0,5713044	0,6841339	0,6709944	0,785411027
Kappa	1,324843	2,4026956	2,4026956	2,984645	2,9108046	3,667414	2,4252561	2,4590969	1,7778006	2,4889251	1,7319219	1,8905742	1,53287537
U2/U1	0,7115063	0,4090713	0,4090713	0,337543	0,3413817	0,2727135	0,4129124	0,4186739	0,5643894	0,3951671	0,5498245	0,5240378	0,675120476
S2-S1	0,1011263	2,8769876	2,8769876	6,838649	6,289271	19,327224	2,9040015	2,9445225	0,6612818	3,3332757	0,6442165	0,9434185	0,237829781
Cs2^2/Cs1^2	1,203734	2,2581076	2,2581076	3,5853125	3,3785277	11,201424	2,2793105	2,3111148	1,5481605	2,3988027	1,5082079	1,6472902	1,361884373
n2	11,658618	15,617521	16,818869	26,563341	20,666713	48,409865	5,0930379	2,7050066	10,489024	21,902541	12,816222	11,72156	5,518351331
u2	282,38884	158,34339	147,37604	125,79472	119,77718	97,872349	195,50059	313,76554	212,50643	183,84328	288,85153	281,4624	257,214035
Shock Class	vW	M	M	M	M	VS	M	M	W	M	W	W	W
Strength Number	1	3	3	3	3	5	3	3	2	3	2	2	2
Strength	0,6482	4,4766	4,4766	9,6641	8,8683	40,0781	4,528	4,6051	1,7529	5,024	1,6818	2,1338	1,0578
P2/P1	1,6482	5,4766	5,4766	10,6641	9,8683	41,0781	5,528	5,6051	2,7529	6,024	2,6818	3,1338	2,0578

EK Tablo 3 Devamı

2001

DOY	10,638669	13,071076	17,647002	23,421065	31,307153	62,44397	86,047998	86,718924	89,910961	94,598924	97,707801	98,439468
Mach	2,87	5000	1,74	5000	15,94	1,65	5000	1,88	2,12	1,46	3,05	2,47
Re2/Re1	0,7232239	0	1,1647063	0	0,1282759	1,2427741	0	1,1257599	0,9393841	1,4251019	0,6710114	0,8425332
M2/M1	0,1874617	0	0,3712592	0	0,0282293	0,4101218	0	0,3480173	0,2699236	0,5118165	0,1706426	0,2296263
M2	0,5338885	0	0,6483452	0	0,4499969	0,6750859	0	0,642644	0,579571	0,7397629	0,5201432	0,56203
Kappa	2,9415525	0	2,0082604	0	3,9530978	1,9021021	0	2,1654021	2,3914154	1,6584793	3,0246035	2,6885598
U2/U1	0,3449878	0	0,4934681	0	0,2529369	0,5272332	0	0,4779092	0,4071508	0,6137723	0,3308208	0,3784289
S2-S1	6,355707	0	1,2715625	0	43,264447	0,949171	0	1,6711394	2,8634806	0,424097	7,3194478	4,3543517
Cs2^2/Cs1^2	3,4142164	0	1,7610999	0	80,280712	1,6573346	0	1,9207968	2,2475061	1,4532087	3,7620781	2,7420334
n2	15,296073	0	25,103255	0	16,99832	7,6084083	0	16,023975	33,479815	8,2923963	12,400874	14,787079
u2	120,03629	0	182,80883	0	93,990654	234,88725	0	202,15798	169,45584	281,26774	145,29874	186,81427
Shock Class	M	VS	W	VS	VS	W	VS	W	M	W	S	M
Strength Number	3	5	2	5	5	2	5	2	3	2	4	3
Strength	8,9725	0	2,5575	0	316,5539	2,1529	0	3,0933	4,4509	1,3942	10,3781	6,3122
P2/P1	9,9725	0	3,5575	0	317,5539	3,1529	0	4,0933	5,4509	2,3942	11,3781	7,3122

EK Tablo 3 Devamı

2001 Devamı

DOY	239,80501	257,05424	272,37939	273,78236	276,33809	284,68049	294,67529	298,33473	301,11232	304,53694
Mach	2,94	2,09	2,02	1,31	1,96	3,63	2,97	7,14	3,14	2,56
Re2/Re1	0,6914442	1,0188101	0,9846873	1,4759476	1,0561439	0,5575001	0,6984998	0,2857833	0,6476142	0,8060094
M2/M1	0,1774506	0,2991648	0,2891449	0,5584034	0,3177369	0,1359944	0,1792614	0,0644343	0,1633167	0,2165383
M2	0,5231367	0,6123888	0,5918781	0,7510135	0,618571	0,4961749	0,5284748	0,4605486	0,5141557	0,5516746
Kappa	2,9644785	2,3789011	2,299225	1,4657421	2,2467776	3,2470607	2,9947283	3,7739333	3,0616789	2,7477182
U2/U1	0,3352623	0,4376276	0,4229702	0,6455532	0,4504808	0,3047271	0,3386833	0,2643871	0,324729	0,3671369
S2-S1	6,7924419	2,5098178	2,4257569	0,2274139	2,0509132	10,236644	6,8617525	24,136404	7,7973135	4,8291764
Cs2^2/Cs1^2	3,5610874	2,185861	2,1126503	1,3022398	2,0246824	4,996825	3,5974251	16,819989	3,9445146	2,8897542
n2	17,193975	16,890198	6,897675	18,468351	11,00921	25,976486	29,348337	18,492273	9,7973723	7,693611
u2	151,73128	161,89214	227,44368	297,10262	222,7791	114,31958	129,62908	94,267887	116,3708	121,14464
Shock Class	M	M	M	Wv	W	S	M	VS	S	M
Strength Number	3	3	3	1	2	4	3	5	4	3
Strength	9,592	4,1006	3,9298	0,9677	3,5261	15,3132	9,7001	62,5641	11,1145	6,9089
P2/P1	10,592	5,1006	4,9298	1,9677	4,5261	16,3132	10,7001	63,5641	12,1145	7,9089

EK Tablo 3 Devamı

2002

DOY	17,239051	48,089931	79,54544	81,140984	82,453762	84,040058	107,43095	109,33502	113,17741	130,43685	131,3924	138,80516
Mach	1,73	5,46	1,5	1,15	4,06	1,57	5000	1,98	2,63	2,25	2,25	2,43
Re2/Re1	1,1580126	0,3760009	1,3632901	1,7782045	0,5064005	1,3405154	0	1,0669209	0,7666681	0,9102077	0,9102077	0,8288889
M2/M1	0,3691255	0,0865761	0,4771187	0,7631176	0,1212008	0,4601795	0	0,3209791	0,2032973	0,2564958	0,2564958	0,2259077
M2	0,6446191	0,4717562	0,7156781	0,8775853	0,4907011	0,711318	0	0,624883	0,5382914	0,5764282	0,5764282	0,5529283
Kappa	1,9967187	3,6398979	1,7142857	1,2238288	3,3900391	1,80074	0	2,2697039	2,7814044	2,5112473	2,5112473	2,6450204
U2/U1	0,4906321	0,2757893	0,5833333	0,8171078	0,2965351	0,5716718	0	0,4550776	0,3544217	0,3987112	0,3987112	0,3723005
S2-S1	1,2642547	18,209985	0,531993	0,025709	12,222887	0,6698145	0	2,0718409	5,2672593	3,3631706	3,3631706	4,2838359
Cs2^2/Cs1^2	1,7509786	10,169414	1,4947917	1,1465043	6,0042618	1,5681367	0	2,0453424	3,0201192	2,4203167	2,4203167	2,697628
n2	8,9852341	37,126958	0,5943051	7,7101215	11,187129	1,80074	0	2,4966743	14,185163	20,592228	25,112473	20,102155
u2	178,94706	100,26151	246,80094	351,86984	117,02287	230,2355	0	194,9443	151,63827	141,97303	143,08993	129,90406
Shock Class	W	VS	W	vW	S	W	VS	W	M	M	M	M
Strength Number	2	5	2	1	4	2	5	2	3	3	3	3
Strength	2,537	35,9458	1,5625	0,403125	19,3031	1,7884	0	3,5722	7,4637	5,078	5,078	6,1938
P2/P1	3,537	36,9458	2,5625	1,403125	20,3031	2,7884	0	4,5722	8,4637	6,078	6,078	7,1938

EK Tablo 3 Devamı

2002 Devamı

DOY	141,87461	143,42774	150,06423	198,64322	200,39748	200,61248	203,20173	206,54135	210,52802	213,18338	213,93023	358,55183
Mach	1,15	1,57	1,54	2,47	2,56	1,58	1,42	1,28	1,75	4,14	1,57	1,46
Re2/Re1	1,7782045	1,3405154	1,3149004	0,8425332	0,8060094	1,3490537	1,386058	1,6832734	1,1714	0,4917822	1,3405154	1,4251019
M2/M1	0,7631176	0,4601795	0,4513863	0,2296263	0,2165383	0,4631106	0,4977942	0,6765788	0,3733928	0,1172327	0,4601795	0,5118165
M2	0,8775853	0,711318	0,697726	0,56203	0,5516746	0,7158487	0,7194954	0,8419416	0,6520713	0,4863632	0,711318	0,7397629
Kappa	1,2238288	1,80074	1,7663309	2,6885598	2,7477182	1,8122097	1,6130415	1,4014868	2,0198021	3,3985637	1,80074	1,6584793
U2/U1	0,8171078	0,5716718	0,5607482	0,3784289	0,3671369	0,575313	0,5969566	0,7526678	0,4963042	0,2929144	0,5716718	0,6137723
S2-S1	0,025709	0,6698145	0,6570155	4,3543517	4,8291764	0,6740808	0,4124779	0,1069766	1,2788703	12,624503	0,6698145	0,424097
Cs2^2/Cs1^2	1,1465043	1,5681367	1,5381723	2,7420334	2,8897542	1,5781249	1,4133948	1,2733715	1,7712211	6,2312106	1,5681367	1,4532087
n2	20,070792	21,248732	3,709295	18,819919	4,3963491	6,8863967	7,5812949	4,4847577	12,724753	5,0978455	16,566808	9,1216359
u2	297,97545	243,47463	259,238	156,05257	163,12196	261,27543	286,6842	337,15456	195,11867	111,02656	245,88353	295,52882
Shock Class	vW	W	W	M	M	W	W	vW	W	S	W	W
Strength Number	1	2	2	3	3	2	2	1	2	4	2	2
Strength	0,403125	1,7884	1,7351	6,3122	6,9089	1,8061	1,3286	0,7436	2,5779	20,2268	1,7884	1,3942
P2/P1	1,403125	2,7884	2,7351	7,3122	7,9089	2,8061	2,3286	1,7436	3,5779	21,2268	2,7884	2,3942

EK Tablo 3 Devamı

2004

DOY	22,044819	100,07569	101,81013	103,7332	115,33996	149,46388	198,87969	204,41278	208,93592	212,8555	312,41631	312,74587
Mach	2,83	1,75	2,13	2,74	1,44	1,34	1,71	4,36	2,05	1,91	2,72	1,81
Re2/Re1	0,7131441	1,1714	0,9438151	0,7416439	1,40558	1,5097479	1,1446252	0,4713675	0,9993114	1,0292014	0,7362305	1,0838433
M2/M1	0,184849	0,3733928	0,2711969	0,1943361	0,5048053	0,5711912	0,3648582	0,1115546	0,2934391	0,3096313	0,1929176	0,3350592
M2	0,5264476	0,6520713	0,5823048	0,5340161	0,7296292	0,7682122	0,6371668	0,4851248	0,6006684	0,6027911	0,5301182	0,6187157
Kappa	2,9005553	2,0198021	2,4026956	2,853399	1,6357604	1,4993088	1,9736352	3,4607328	2,3333719	2,1894619	2,8325713	2,0847754
U2/U1	0,3401796	0,4963042	0,4090713	0,3481824	0,6053644	0,6603368	0,4849601	0,2903658	0,429252	0,438989	0,3456409	0,4601147
S2-S1	6,2671257	1,2788703	2,8769876	5,7870968	0,4182875	0,2326218	1,249639	13,594599	2,461783	1,998594	5,7448552	1,6089161
Cs2^2/Cs1^2	3,3666315	1,7712211	2,2581076	3,2020417	1,4333017	1,3320621	1,7307361	6,7940629	2,1440263	1,9730324	3,1786691	1,8492778
n2	17,693387	9,0891096	9,6107825	9,4162168	8,1788018	11,394747	14,999628	12,112565	4,900081	5,6926008	60,617026	35,441182
u2	161,81049	225,34986	181,34655	145,54616	262,50755	243,50032	189,86963	110,3659	259,78837	190,43104	121,38547	222,64196
Shock Class	M	W	M	M	W	vW	W	S	M	W	M	W
Strength Number	3	2	3	3	2	1	2	4	3	2	3	2
Strength	8,8336	2,5779	4,4766	8,1696	1,3614	1,0128	2,4961	22,4569	4,003	3,4106	8,1026	2,9409
P2/P1	9,8336	3,5779	5,4766	9,1696	2,3614	2,0128	3,4961	23,4569	5,003	4,4106	9,1026	3,9409

EK Tablo 3 Devamı

2005

DOY	11,83163	17,302744	21,699613	126,50255	127,76286	165,74574	167,33955	191,11608	236,23453	243,25932	252,5532	258,35347
Mach	1,27	1,84	2,48	1,92	1,55	1,56	1,15	1,61	2,27	1,69	2,56	1,89
Re2/Re1	1,6701229	1,1018075	0,8459443	1,0345899	1,3234388	1,3319771	1,7782045	1,2126462	0,9182984	1,272902	0,8060094	1,131748
M2/M1	0,671293	0,3406127	0,230556	0,3112525	0,4543174	0,4572484	0,7631176	0,4001795	0,2587757	0,4200642	0,2165383	0,3498684
M2	0,8353639	0,6289707	0,5643054	0,6059471	0,7022566	0,7067873	0,8775853	0,6587201	0,581552	0,6914516	0,5516746	0,6460623
Kappa	1,3905377	2,1193297	2,6994447	2,200925	1,7778006	1,7892703	1,2238288	1,8559905	2,5335695	1,9482137	2,7477182	2,1769202
U2/U1	0,7467876	0,4677409	0,379961	0,4412874	0,5643894	0,5680306	0,8171078	0,5144518	0,4022553	0,5400146	0,3671369	0,4804513
S2-S1	0,1061408	1,6355832	4,3719807	2,0090578	0,6612818	0,6655482	0,025709	0,9261608	3,3930654	0,9721812	4,8291764	1,6800284
Cs2^2/Cs1^2	1,2634233	1,8799288	2,7531348	1,9833624	1,5481605	1,5581486	1,1465043	1,6171568	2,4418306	1,6975124	2,8897542	1,9310138
n2	31,982366	9,1131177	15,926723	23,990083	33,778212	12,703819	7,5877386	17,446311	24,322267	10,520354	35,720337	6,0953765
u2	301,52565	246,87925	227,46741	156,99693	213,51865	252,31459	379,88563	183,14902	177,83466	245,76126	128,72393	262,63313
Shock Class	vW	W	M	W	W	W	vW	W	M	W	M	W
Strength Number	1	2	3	2	2	2	1	2	3	2	3	2
Strength	0,73	3,0062	6,3418	3,4337	1,7529	1,7706	0,403125	2,0765	5,132	2,2293	6,9089	3,115
P2/P1	1,73	4,0062	7,3418	4,4337	2,7529	2,7706	1,403125	3,0765	6,132	3,2293	7,9089	4,115

EK Tablo 3 Devamı

2006

DOY	1,561559	230,65889	231,45171	246,97784	348,57774
Mach	1,57	1,15	1,85	1,81	1,78
Re2/Re1	1,3405154	1,7782045	1,1077956	1,0838433	1,1914812
M2/M1	0,4601795	0,7631176	0,3424638	0,3350592	0,3797939
M2	0,711318	0,8775853	0,632389	0,6187157	0,6632497
Kappa	1,80074	1,2238288	2,1308478	2,0847754	2,0544273
U2/U1	0,5716718	0,8171078	0,470283	0,4601147	0,5048122
S2-S1	0,6698145	0,025709	1,6444722	1,6089161	1,3007938
Cs2^2/Cs1^2	1,5681367	1,1465043	1,8901458	1,8492778	1,8015849
n2	10,80444	8,199653	15,129019	15,427338	3,9034119
u2	250,44611	287,51953	182,04398	185,72004	301,10337
Shock Class	W	vW	W	W	W
Strength Number	2	1	2	2	2
Strength	1,7884	0,403125	3,0279	2,9409	2,6393
P2/P1	2,7884	1,403125	4,0279	3,9409	3,6393

EK Tablo 3 Devamı

2007

DOY	204,82676	238,75365	270,4536	316,89278	351,08577
Mach	1,5	1,48	2,67	1,3	1,57
Re2/Re1	1,3632901	1,4446238	0,7783285	1,5730271	1,3405154
M2/M1	0,4771187	0,5188277	0,2063893	0,6103303	0,4601795
M2	0,7156781	0,7498967	0,5464784	0,7934294	0,711318
Kappa	1,7142857	1,6811982	2,8237072	1,4413646	1,80074
U2/U1	0,5833333	0,6221801	0,3598122	0,693787	0,5716718
S2-S1	0,531993	0,4299066	5,3473697	0,1571751	0,6698145
Cs2^2/Cs1^2	1,4947917	1,4731157	3,0660526	1,2921783	1,5681367
n2	7,0285714	15,298903	11,294829	19,458422	16,566808
u2	217,29312	239,71108	136,23413	269,14265	201,60066
Shock Class	W	W	M	vW	W
Strength Number	2	2	3	1	2
Strength	1,5625	1,427	7,5924	0,8625	1,7884
P2/P1	2,5625	2,427	8,5924	1,8625	2,7884

EK Tablo 3 Devamı

2008

DOY	194,36988	221,95294
Mach	1,15	1,43
Re2/Re1	1,7782045	1,395819
M2/M1	0,7631176	0,5012998
M2	0,8775853	0,7245623
Kappa	1,2238288	1,6244009
U2/U1	0,8171078	0,6011605
S2-S1	0,025709	0,4153827
Cs2^2/Cs1^2	1,1465043	1,4233483
n2	8,199653	10,721046
u2	448,03821	226,68113

Shock Class	**vW**	**W**
StrengthNumber	1	2
Strength	0,403125	1,345
P2/P1	1,403125	2,345

EK Tablo 3 Devamı

2010

DOY	95,32985	215,7049
Mach	2,58	2,08
Re2/Re1	0,8123063	1,0139354
M2/M1	0,21823	0,2977334
M2	0,5559846	0,6094587
Kappa	2,7691848	2,3675188
U2/U1	0,3700051	0,4355337
S2-S1	4,8669043	2,4978091
Cs2^2/Cs1^2	2,9123305	2,1754023
n2	8,3075543	10,890586
u2	212,43371	181,46352
Shock Class	**M**	**M**
StrengthNumber	3	3
Strength	6,9707	4,0762
P2/P1	7,9707	5,0762

EK Tablo 3 Devamı

2011

DOY	158,38129	187,09234	260,12199
Mach	1,23	1,39	1,69
Re2/Re1	1,6175206	1,5660818	1,272902
M2/M1	0,6501499	0,5925043	0,4200642
M2	0,8090532	0,7968769	0,6914516
Kappa	1,3467412	1,5552531	1,9482137
U2/U1	0,7232667	0,6849762	0,5400146
S2-S1	0,1027978	0,2413017	0,9721812
Cs2^2/Cs1^2	1,2236304	1,3817659	1,6975124
n2	3,9055495	6,998639	7,5980332
u2	283,18401	258,25936	199,91513
Shock Class	**vW**	**W**	**W**
Strength Number	1	2	2
Strength	0,6755	1,0879	2,2293
P2/P1	1,6755	2,0879	3,2293

EK Tablo 3 Devamı

2012

DOY	2,040698	72,36222	331,1921	349,7855
Mach	1,32	3,66	1,57	1,89
Re2/Re1	1,487214	0,562108	1,340515	1,131748
M2/M1	0,562666	0,137118	0,46018	0,349868
M2	0,756746	0,500275	0,711318	0,646062
Kappa	1,476931	3,273896	1,80074	2,17692
U2/U1	0,650481	0,307246	0,571672	0,480451
S2-S1	0,22915	10,32124	0,669814	1,680028
Cs2^2/Cs1^2	1,312181	5,038121	1,568137	1,931014
n2	7,384655	34,7033	4,50185	12,19075
u2	232,9373	132,6379	251,5868	156,7863
Shock Class	vW	S	W	W
Strength Number	1	4	2	2
Strength	0,9827	15,448	1,7884	3,115
P2/P1	1,9827	16,448	2,7884	4,115

EK Tablo 3 Devamı

2013

DOY	19,698681
Mach	2,93
Re2/Re1	0,6890924
M2/M1	0,1768471
M2	0,5213573
Kappa	2,9543953
U2/U1	0,3341219
S2-S1	6,7693384
Cs2^2/Cs1^2	3,5489749
n2	13,885658
u2	128,46581
Shock Class	M
Strength Number	3
Strength	9,556
P2/P1	10,556

EK Tablo 3 Devamı

2014

DOY	7,600984	9,813251	50,130533	50,130533	58,671991	58,671991	84,808982	109,74523	127,89779
Mach	2,32	1,73	1,64	1,98	1,64	1,98	2,65	1,34	1,97
Re2/Re1	0,860244	1,1580126	1,2352421	1,0669209	1,2352421	1,0669209	0,7724983	1,5097479	1,0615324
M2/M1	0,2382	0,3691255	0,4076363	0,3209791	0,4076363	0,3209791	0,2048433	0,5711912	0,319358
M2	0,5591648	0,6446191	0,6709944	0,624883	0,6709944	0,624883	0,5423849	0,7682122	0,621727
Kappa	2,558567	1,9967187	1,8905742	2,2697039	1,8905742	2,2697039	2,8025558	1,4993088	2,2582408
U2/U1	0,3813592	0,4906321	0,5240378	0,4550776	0,5240378	0,4550776	0,3571169	0,6603368	0,4527792
S2-S1	3,7868905	1,2642547	0,9434185	2,0718409	0,9434185	2,0718409	5,3073145	0,2326218	2,061377
Cs2^2/Cs1^2	2,5343613	1,7509786	1,6472902	2,0453424	1,6472902	2,0453424	3,0430859	1,3320621	2,0350124
n2	10,490125	5,7904842	3,4030336	35,180411	3,4030336	35,180411	9,8089453	8,6959908	8,807139
u2	132,6203	191,82527	200,6872	160,9575	200,6872	160,9575	135,70713	313,95123	149,61306
Shock Class	M	W	W	W	W	W	M	vW	W
Strength Number	3	2	2	2	2	2	3	1	2
Strength	5,5681	2,537	2,1338	3,5722	2,1338	3,5722	7,528	1,0128	3,5491
P2/P1	6,5681	3,537	3,1338	4,5722	3,1338	4,5722	8,528	2,0128	4,5491

EK 4. Korelasyonlar

ACE	1998	1999	2000	2001	2002	2004	2005	2006	2007	2008	2010	2011	2012	2013	2014	Correlation
Total ∑SSN	26438	35073	45142	45016	39937	15857	11036	5612	2897	885	5665	18322	19342	22250	27215	
$\sum M_1$	51,7	40,46	79,53	88,58	63,67	28,46	21,79	8,16	8,52	2,58	4,66	4,31	8,44	2,93	17,25	**0,85904**
$\sum St$	145,572	97,2668	206,273	590,906	190,716	72,0331		10,7996	13,2328	1,74813	11,0469	3,9927	21,3341	9,556	31,607	**0,72151**
$\sum St_{Rel}$	68	45	95	120	81	32	25	14	10	3	6	5	9	3	19	**0,83973**
$\sum M_1/M_2$	87,7683	67,259	133,41	167,329	108,896	49,5725	33,8944	12,021	12,6801	3,30523	7,94103	5,60645	14,1015	5,6546	27,8083	**0,85454**
$\sum M_2$	15,4865	13,3854	24,8025	17,1563	19,0792	7,95054	8,05068	3,50326	3,5168	1,60215	1,16544	2,29738	2,6144	0,52136	5,72786	**0,83253**
$\sum K$	52,5755	42,1041	82,4251	73,6584	63,2743	30,1112	24,4635	9,29462	9,4613	2,84823	5,1367	4,85021	8,72849	2,9544	19,4359	**0,85667**
$\sum n_1$	196	116,1	304,6	184,1	169,747	89,9	116,6	29,1	39,9	13,3	7,6	11,3	23,7	4,7	54,8	**0,76341**
$\sum u_1$	9915,65	7716,64	16847,9	12131,9	11939,1	5784,84	5323,89	2177,17	1876,99	925,395	990,784	1138,77	1556,22	384,488	3397,93	**0,82624**
$\sum n_1 u_1$	77650,2	44164,1	126763	77450,4	67970	38352	48327,1	11854,7	15029,3	6162,44	3638,98	4275,9	9294,2	1807,09	20279	**0,75631**
$\sum n_2$	421,34	255,536	651,37	461,142	361,718	209,157	229,187	53,4639	69,6475	18,9207	19,1981	18,5022	58,7806	13,8857	120,76	**0,79505**
$\sum u_2$	4888,19	4130,5	8548,69	5162,9	6169,95	2605,75	2776,69	1206,83	1063,98	674,719	393,897	741,358	773,948	128,466	1647,01	**0,80724**
$\sum n_2 u_2$	77823,4	44261	128207	77311,5	68456,3	37651,9	48887,7	11858,1	15310,3	6104,02	3741,05	4432,41	9367,08	1783,83	20571,9	**0,75561**
$\sum Cs_2^2/Cs_1^2$	63,4789	46,7203	94,3862	180,908	80,3311	32,7106	22,7099	8,25565	8,89427	2,56985	5,08773	4,30291	9,84945	3,54897	18,0808	**0,79654**

ÖZGEÇMİŞ

KİŞİSEL BİLGİLER

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Doğum Yeri :

Doğum Tarihi :

EĞİTİM DURUMU

Lisans Eğitimi : Trakya Üniversitesi, Fen Fakültesi, Fizik Bölümü

Yüksek Lisans : Balıkesir Üniversitesi Pedagojik Formasyon

Yabancı Dil : İngilizce

BİLİMSEL FAALİYETLERİ

a)Yayınlar

'Correlation between sunspots and interplanetary shocks measured by ACE during 1998–2014 and some estimations for the 22nd solar cycle and the years between 2015 and 2018 with artificial neural network using the Çavuş 2013 model', Advances in Space Research ,Volume 65, Issue 3, 1 October 2019, Pages 1035-1047

b) Bildiriler

c) Katıldığı Projeler

117F336 numaralı Tübitak projesi,

Proje adı : Güneş'te Meydana Gelen Koronal Kütle Atımlarından Sonra Gezegenler Arası Ortamda Oluşan Şok Dalgalarının İncelenmesi

İŞ DENEYİMİ

Çalıştığı Kurumlar ve Yıl

Boğaziçi Eğitim Kurumları, 2013-2015

Edremit Özel Uğur Anadolu Lisesi, 2015-2017

Arnavutköy Anadolu Lisesi, 2019-

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