

DÜZGÜN ÇEMBERSEL HAREKET

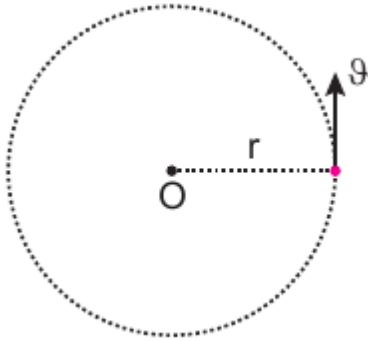
Çembersel yörüngede sabit süratle yapılan harekete çembersel hareket denir.

PERİYOT:Çembersel yörüngede bir tam tur için geçen süreye periyot denir.T harfi ile gösterilir.Birimi saniyedir.

FREKANS:Çembersel hareket yapan bir cismin bir saniyedeki tur sayısıdır.Birimi herz!dir.

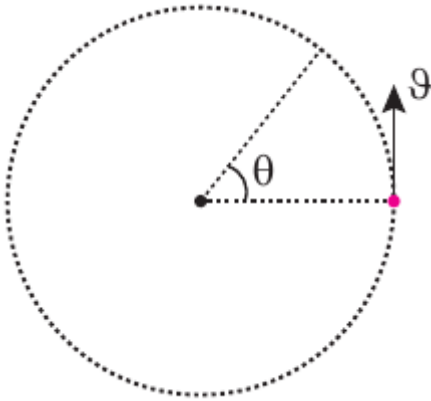
$$T \cdot f = 1$$

ÇİZGİSEL SÜRAT:Çembersel hareket yapan bir cismin çembersel yörüngede aldığı yoldur.



$$x = \vartheta \cdot t \quad \vartheta = \frac{2\pi r}{T}$$
$$2\pi \cdot r = \vartheta \cdot T \quad \vartheta = 2\pi \cdot r \cdot f$$

AÇISAL SÜRAT:Çembersel hareket bir cismin birim zamanda taradığı açığa denir. Birimi rad.\s dir.

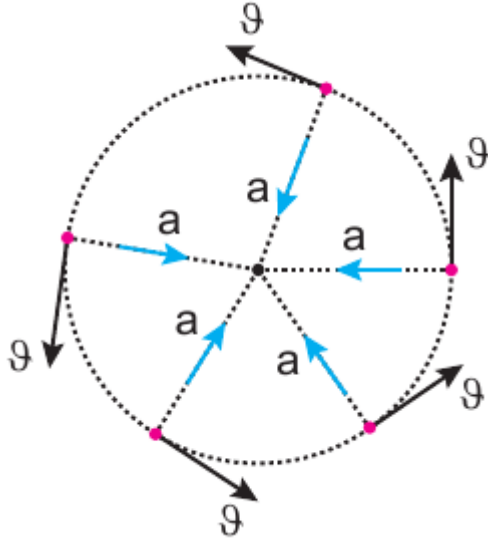


$$\omega = \frac{2\pi}{T} = 2\pi f$$

Çizgisel süratle açısal sürat arasındaki ilişki

$$\left. \begin{array}{l} \vartheta = 2\pi fr \\ \omega = 2\pi f \end{array} \right\} \vartheta = \omega \cdot r$$

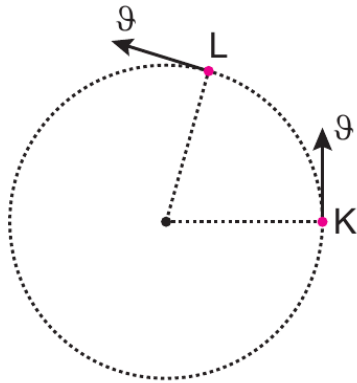
MERKEZCİL İVME:



$$a = \frac{\vartheta^2}{r}$$

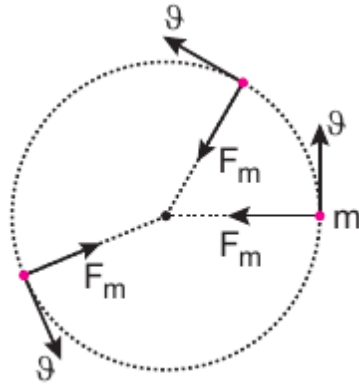
$$a = \omega^2 \cdot r$$

ORTALAMA İVME:



$$\vec{a} = \frac{\Delta \vec{v}}{\Delta t}$$

MERKEZCİL KUVVET:

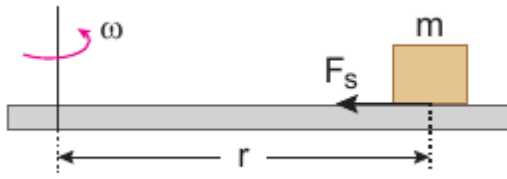


$$F = m \cdot a$$

$$F = m \cdot \frac{\vartheta^2}{r}$$

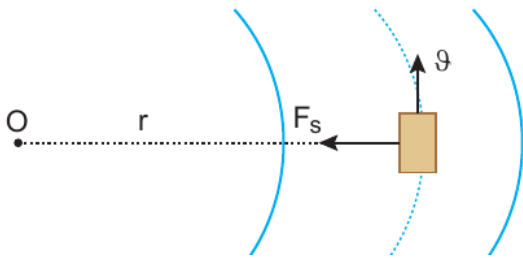
$$F = m \cdot \omega^2 \cdot r$$

YATAY DÜZLEMDE ÇEMBERSEL HAREKET:



$$F_{\text{mer}} = F_{\text{sür}} \quad m \cdot \omega^2 \cdot r = k \cdot m \cdot g$$

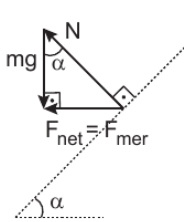
YATAY VİRAJ:



$$F_{\text{mer}} = F_s$$

$$\frac{m\vartheta^2}{r} = kmg$$

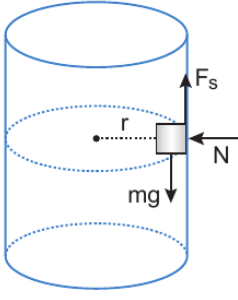
EĞİMLİ VİRAJ



$$\tan \alpha = \frac{F_{\text{mer}}}{mg} = \frac{m \cdot \vartheta^2}{r \cdot mg}$$

$$\tan \alpha = \frac{\vartheta^2}{rg} \text{ bulunur.}$$

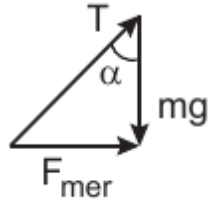
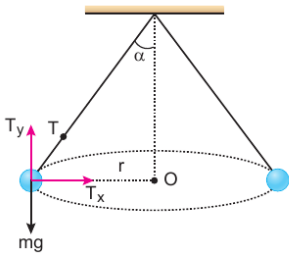
DİK SİLİNDİR:



$$mg = k \cdot N$$

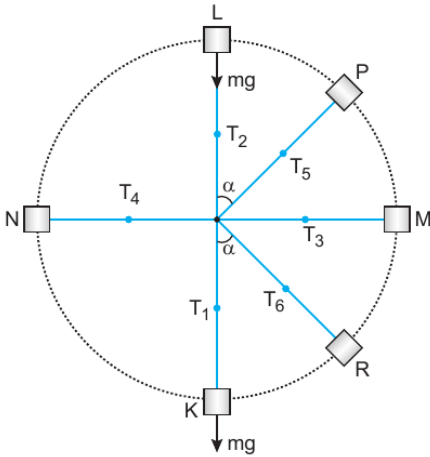
$$mg = F_s \quad mg = k \cdot m \omega^2 r$$

KONİK SARKAÇ:



$$\tan \alpha = \frac{F_{mer}}{mg} = \frac{\rho \omega^2 r}{\rho g} \quad \tan \alpha = \frac{\omega^2 r}{g}$$

DÜŞEY DÜZLEMDE ÇEMBERSEL HAREKET:



K noktası için:

$$T_1 = F_m + mg$$

L noktası için:

$$T_2 = F_m - mg$$

M ve N noktaları için:

$$T_3 = T_4 = F_m$$

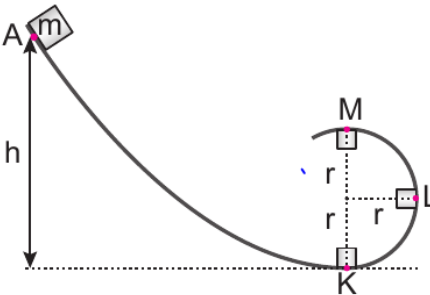
P noktası için:

$$T_5 = F_m - mg \cos \alpha$$

R noktası için:

$$T_6 = F_m + mg \cos \alpha$$

SÜRTÜNMESİZ RAYLAR



Cisim K dan geçerken;

$$N_K = F_{m_K} + mg \text{ olur.}$$

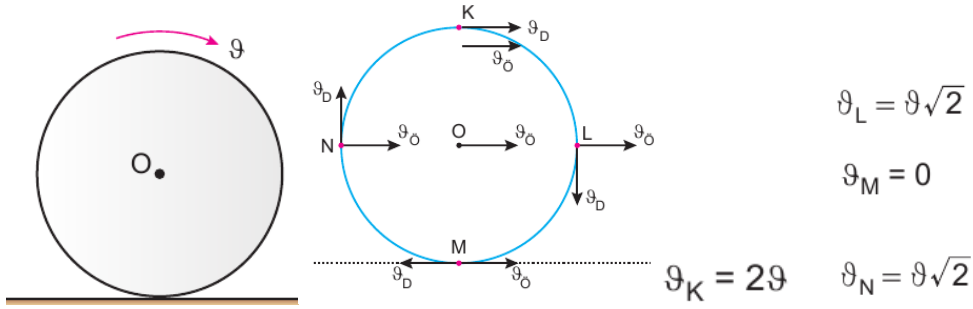
Cisim L den geçerken;

$$N_L = F_{m_L} \text{ olur.}$$

Cisim M den geçerken;

$$N_M = F_{m_M} - mg \text{ olur.}$$

DÖNREK ÖTELEME HAREKETİ:



DÖNME KİNETİK ENERJİSİ:

$$E_k = \frac{1}{2} I \omega^2$$

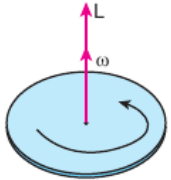
$$E_k = \frac{1}{2} m v^2 + \frac{1}{2} I \omega^2$$

AÇISAL MOMENTUM:

$$\vec{L} = \vec{r} \times \vec{P}$$

$$L = P \cdot r \quad L = m \cdot \omega \cdot r$$

AÇISAL MOMENTUMUN YÖNÜ:



Sağ elin dört parmağı hız yönünü ,avuç içi yer vektörü yönünde tutulunca ,açılan baş parmak açıs al momentumun yönünü gösterir.

$$\vec{L} = I \cdot \vec{\omega}$$

EYLEMSİZLİK TORKU:

$$I = m \cdot r^2$$

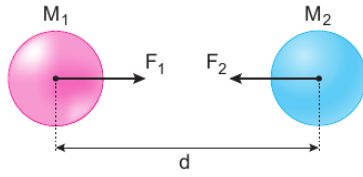
AÇISAL MOMENTUMUN KORUNUMU.:

$$\vec{L}_{ilk} = \vec{L}_{son}$$

$$I_{ilk} \cdot \vec{\omega}_{ilk} = I_{son} \cdot \vec{\omega}_{son}$$

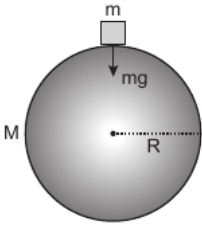
Bir merkez etrafında döneb cisimler dışarıdan bir tork uygulanmazsa cimin açısal momentumu korunur.

KÜTLE ÇEKİM KUVVETİ:



$$F_1 = F_2 = \frac{G \cdot M_1 \cdot M_2}{d^2}$$

ÇEKİM İVMESİ:



$$F = mg$$

$$\frac{G \cdot M \cdot \rho r}{R^2} = \rho r \cdot g$$

$$g = \frac{G \cdot M}{R^2}$$

$$g = \frac{G \cdot M}{R^2}$$

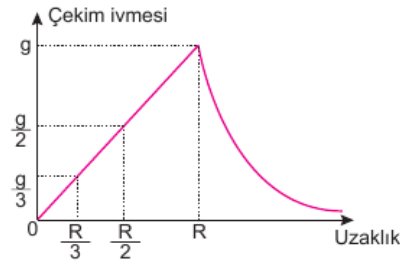
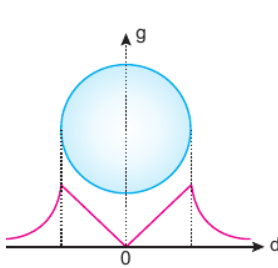
$$m = d \cdot V$$

$$V = \frac{4}{3} \pi R^3$$

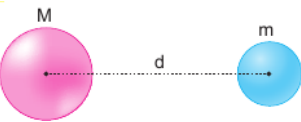
$$g = \frac{G \cdot d \cdot \frac{4}{3} \pi R^3}{R^2}$$

$$g = \frac{4}{3} \pi \cdot G \cdot d \cdot R$$

$$g = K \cdot d \cdot R$$



KÜTLE ÇEKİM POTANSİYEL ENERJİ:



$$E_P = -\frac{G \cdot M \cdot m}{d}$$

GEZEĞEN ETRAFINDA DÖNEN UYDUNUN HIZI:

$$F_{\text{çekim}} = F_{\text{merkezcil}} \quad g^2 = \frac{G \cdot M}{R}$$

$$\frac{G \cdot M \cdot m}{R^2} = m \cdot g^2 \quad g = \sqrt{\frac{G \cdot M}{R}}$$

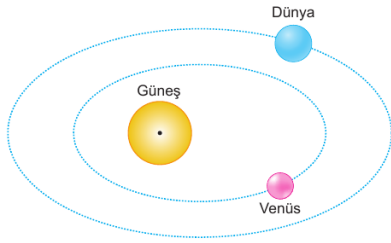
KEPLER KANUNU:

Yörüngeler kanunu

Alanlar kanunu

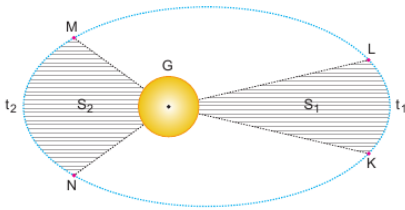
Periyotlar kanunu

YÖRÜNGELER KANUNU:



Güneş sistemindeki her gezegen, odaklarının birinde güneş bulunan bir eliptik yörünge izler.

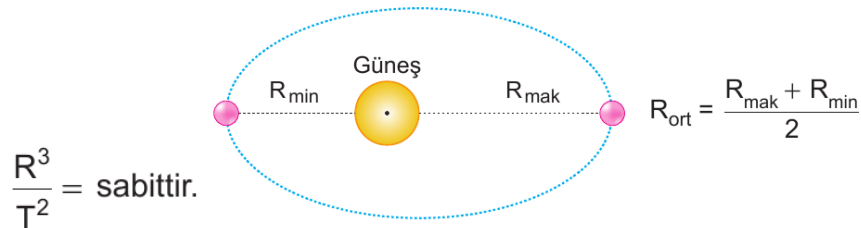
ALANLAR KANUNU:



$$t_1 = t_2 \Rightarrow S_1 = S_2$$

Gezegeni güneşe birleştiren konum vektörü eşit zamanlarda eşit alanlar tararlar.

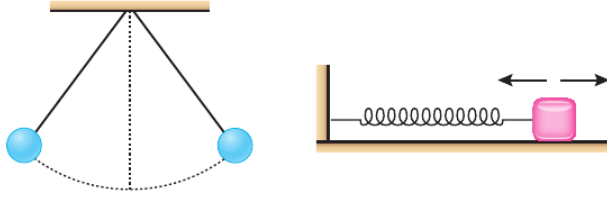
PERİYOTLAR KANUNU:



$$\frac{R^3}{T^2} = \text{sabittir.}$$

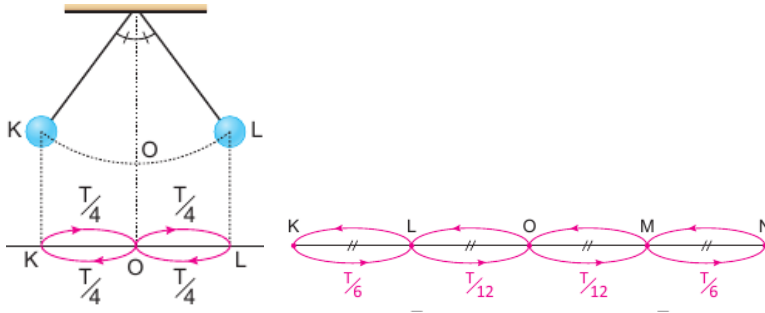
$$R_{\text{ort}} = \frac{R_{\text{mak}} + R_{\text{min}}}{2}$$

BASİT HARMONİK HAREKET



Eşit iki denge noktası etrafında, periyodik olarak gidip gelme hareketine, basit harmonik hareket denir.

PERİYOT:

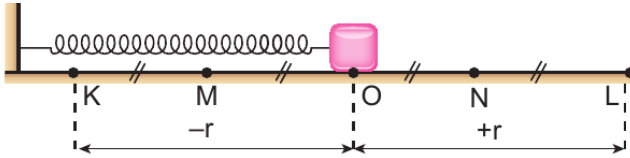


FRKANS:

$$T \cdot f = 1$$

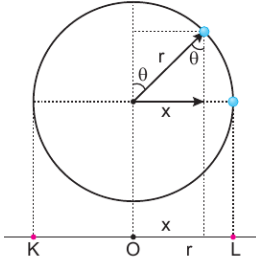
$$T = \frac{1}{f}, f = \frac{1}{T}$$

GENLİK:



BBH yapan cismin denge konumundan maksimum uzaklığına genlik denir.

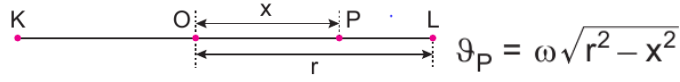
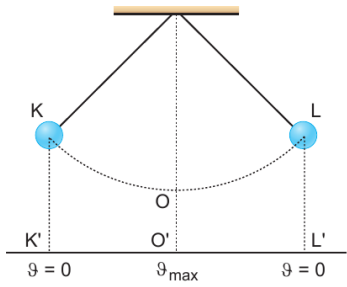
UZANIM:



BHH yapan cismin herhangi bir andaki denge noktasına uzaklığına uzanım denir.

$$\sin\theta = \frac{x}{r} \quad x = r \cdot \sin\theta \quad \omega = \frac{\theta}{t} \Rightarrow \theta = \omega \cdot t \quad x = r \cdot \sin\omega t$$

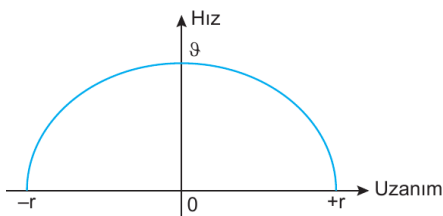
BHH HIZ ,İVME.KUVVET:



$$v = \omega \sqrt{r^2 - x^2}$$

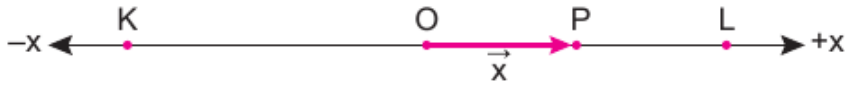
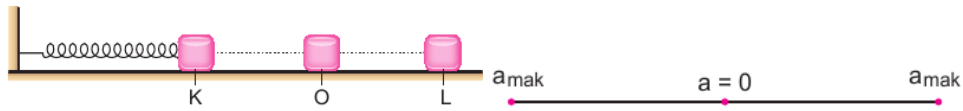
$$v_{\max} = \omega \cdot r$$

BHH YAPAN BİR CİSMİN HERHANGİ BİR ANDAKİ HIZI

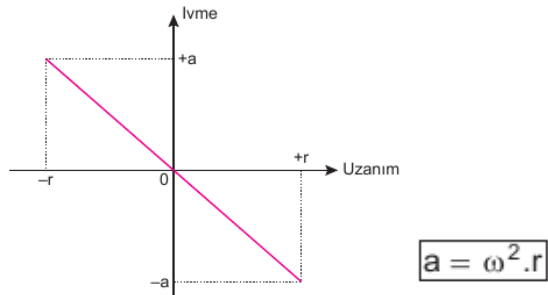


$$v = \omega \cdot r \cdot \cos\omega t$$

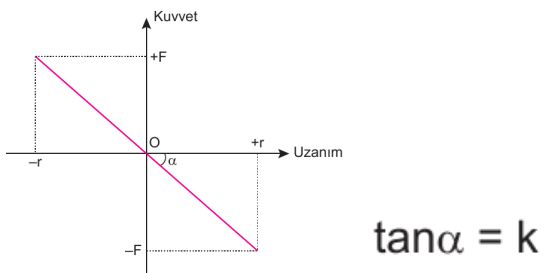
İVME:



$$\vec{a}_P = -\omega^2 \cdot \vec{x}$$

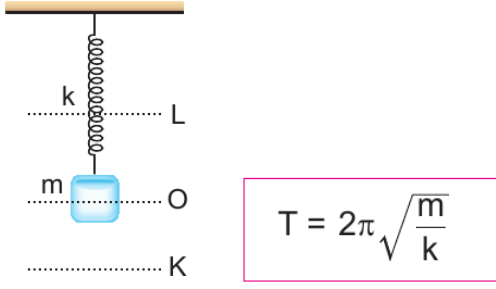


KUVVET:



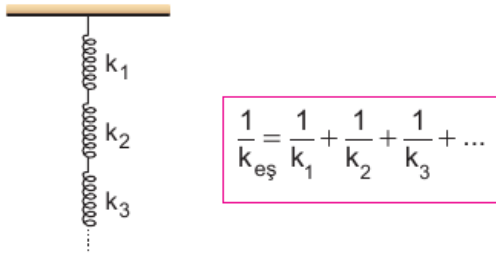
YAYLI SARKAÇ VE BASİT SARKAÇ

YAYLI SARKAÇ:

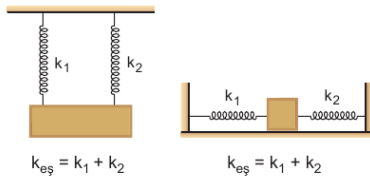


YAYLARI BAĞLANMASI

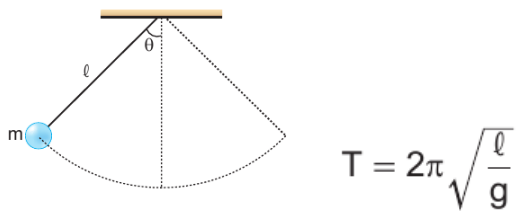
SERİ BAĞLAMA:



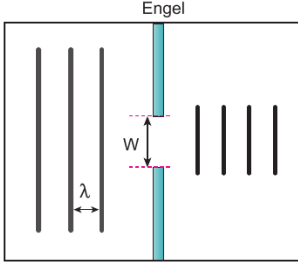
PARALEL BAĞLAMA:



BASİT SİRKAÇ:

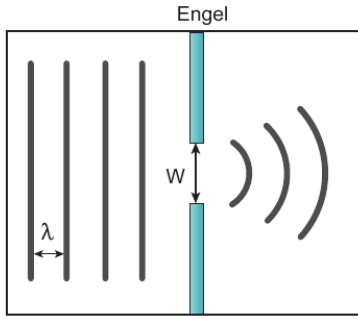


DALGA, KIRINIM, GİRİŞİM VE DOPLER OLAYI

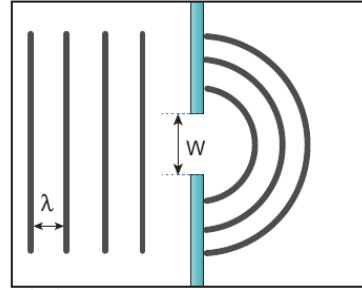


Doğrusal su dalgasını iki engel arasındaki boşluktan geçerken dairesel görünüm almasına kırınım denir.

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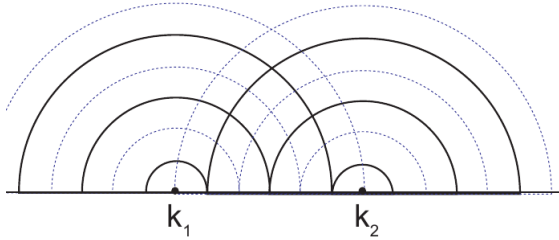


$$w = \lambda$$

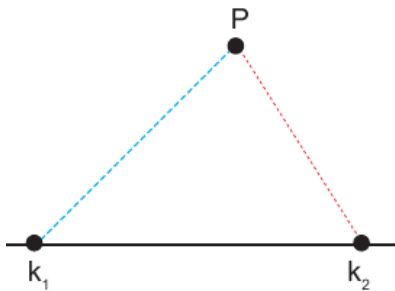


$$w < \lambda$$

SU DALGALARINDA GİRİŞİM



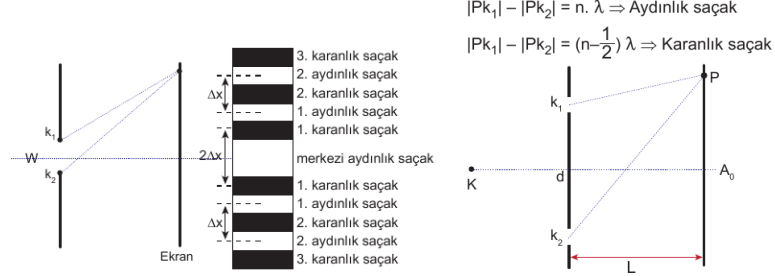
Aynı anda çlişan dairesel dalgaların iç içe geçmesi olayına girişim denir.



$$|Pk_1| - |Pk_2| = n \cdot \lambda \quad \text{karın çizgisi}$$

$$|Pk_1| - |Pk_2| = \left(n - \frac{1}{2}\right)\lambda \text{ düğüm çizgisi}$$

ÇİFT YARIKTA GİRİŞİM



Saçak aralığı (Δx) : Ardışık iki aydınlık ya da iki karanlık saçak arasındaki mesafedir.

$$\Delta x = \frac{\lambda L}{d \cdot n}$$

TEK YARIKTA KIRINIM

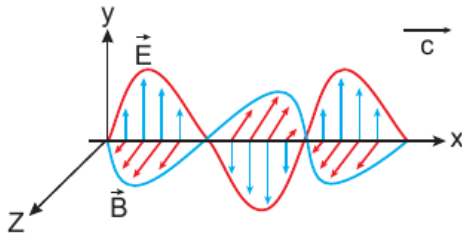
$Pk_2 - Pk_1 = \left(n + \frac{1}{2}\right)\lambda \Rightarrow$ P noktası n. aydınlık saçak üzerindedir

$Pk_2 - Pk_1 = n \cdot \lambda \Rightarrow$ P noktası n. karanlık saçak üzerindedir.

Saçak aralığı ise;

$$\Delta x = \frac{\lambda \cdot L}{W \cdot n} \text{ olur.}$$

ELEKTROMANYETİK DALGALAR



ELEKTROMANYETİK SPEKTRUM

1. Radyo dalgaları:

2. Mikro dalga:

3. Kızılötesi ışınlar:

4. Görünür ışık:

5. Mor ötesi ışınlar:

6. X ışınları:

7. Gama ışınları:

DOPLER OLAYI

Dalgayı oluşturan kaynakların hareketi sonucu oluşan dalgaların dalga boyunda ve frekansında oluşan değişmeye dopler olayı denir. Işık ses ve su dalgalarında dopler olayı oluşur.

