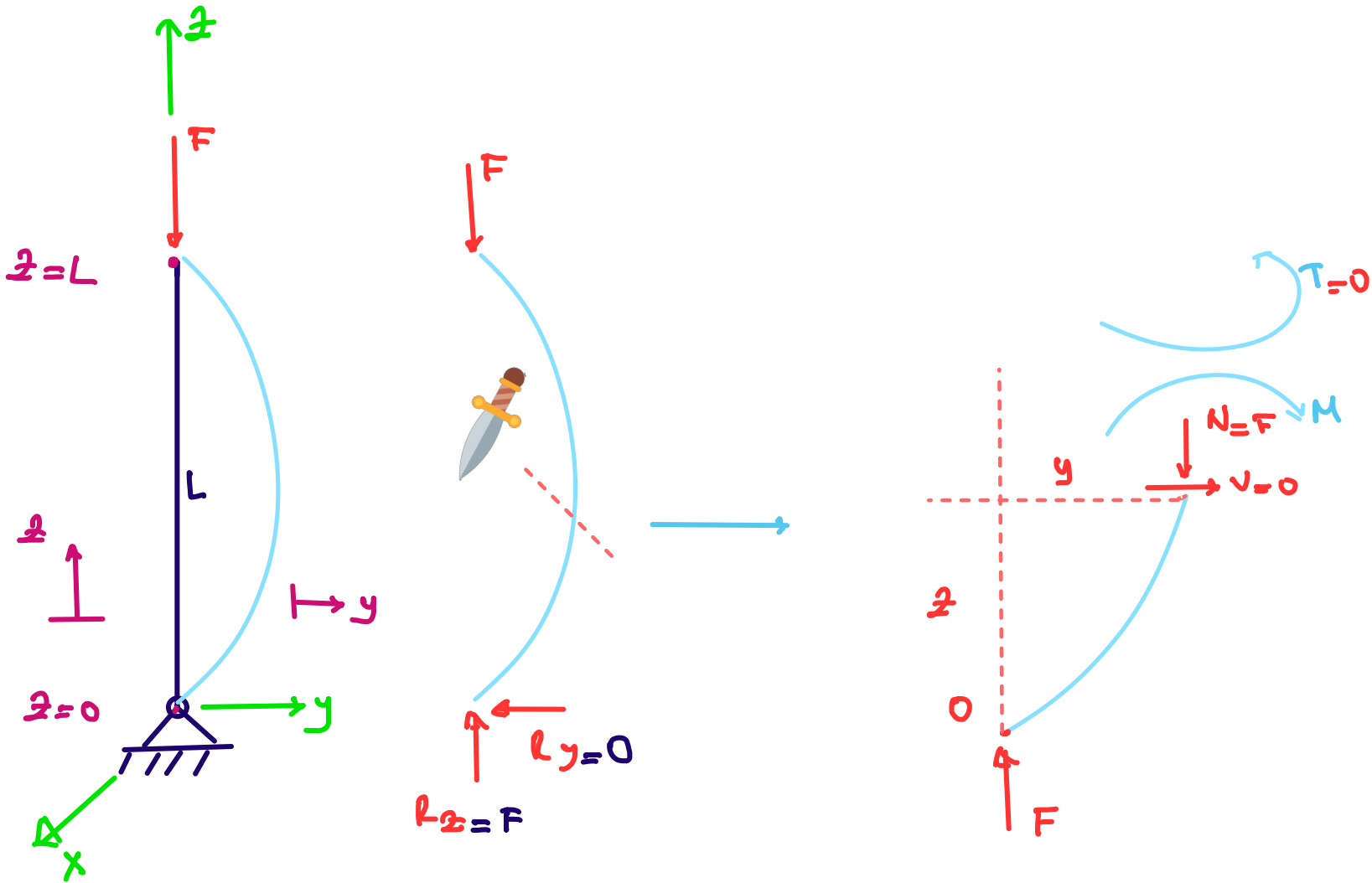


# BİKLİLÜLMA

AMAC BİKLİLÜLMA'YA SEDEP OLAN KLİTİK KUNVETİ DİLMK.



$$\frac{M}{EI} = \frac{d^2y}{dz^2}$$

$$\sum M_0 = 0 \quad \uparrow (+)$$

$$\Rightarrow -F \cdot y - M = 0 \quad \Rightarrow \quad M = -F \cdot y$$

$$-\frac{F}{EI} y = \frac{d^2 y}{dz^2} = y'' \quad \Rightarrow \quad y'' + k^2 y = 0$$

HOMOJEN, İKİNCİ MERTEDEDEKİ  
DİF. DENKLEM

$$y(D^2 + k^2) = 0$$

$$y \neq 0$$

$$\Rightarrow D^2 + k^2 = 0$$

$$\Rightarrow D^2 = -k^2$$

$$\Rightarrow D = \sqrt{-k^2} = \sqrt{i^2 k^2} = \pm ik = \Gamma_{1,2}$$

$$\Gamma_{1,2} = \alpha \pm \beta i$$

$$y = e^{\alpha x} [c_1 \cos \beta x + c_2 \sin \beta x]$$

$$\alpha = 0$$

$$y = y$$

$$\Rightarrow$$

$$\beta = k$$

$$x = z$$

$$k = \sqrt{\frac{F}{EI}}$$

$$y = e^0 [c_1 \cos kz + c_2 \sin kz]$$

$c_1$  ve  $c_2$  SINİR SAĞTAKINDAN

BULUNUR  $z=0$   $y=0$  (A)

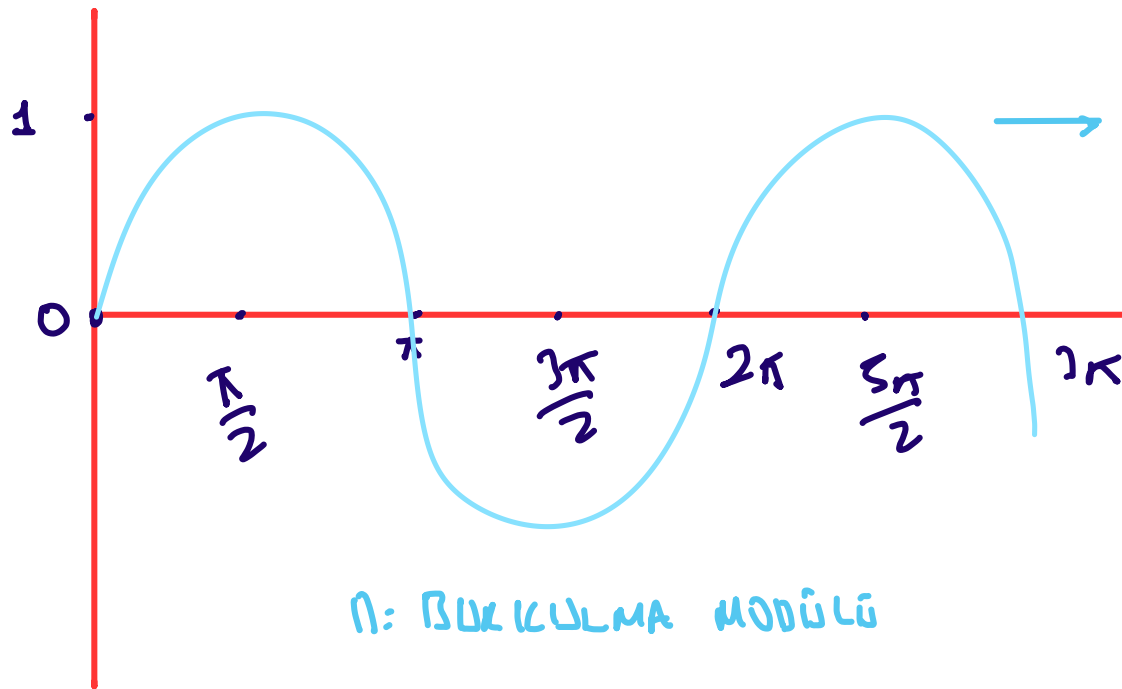
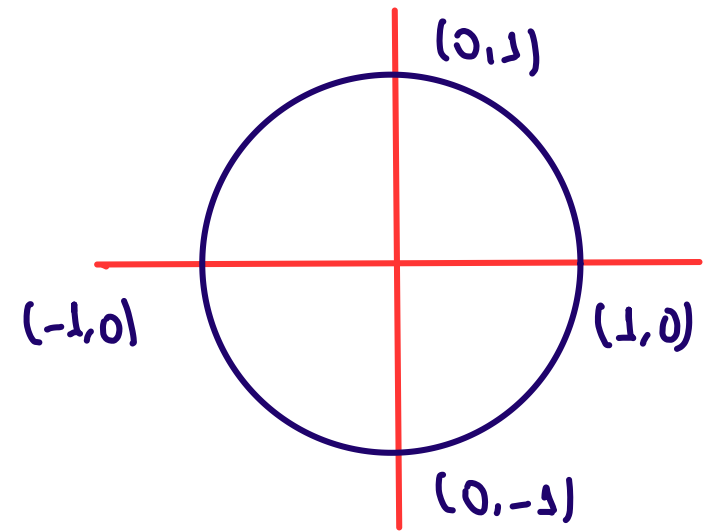
$z=L$   $y=0$  (B)

$$\textcircled{A} \quad 0 = c_1 \cdot \frac{\cos 0}{1} + c_2 \cdot \frac{\sin 0}{0}$$

$$\Rightarrow c_1 = 0$$

$$\Rightarrow y = c_2 \cdot \sin kz$$

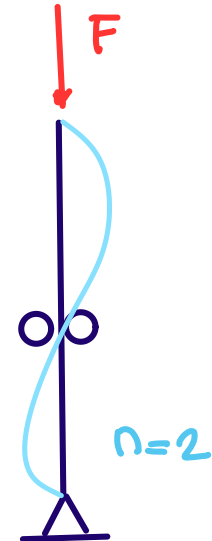
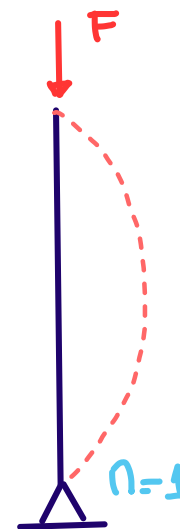
$$\textcircled{B} \quad 0 = c_2 \cdot \sin(k \cdot L)$$



$$\sin(n \cdot \pi) = 0$$

$$n = 0, 1, 2, 3, 4, \dots$$

$n$ : BÜKÜLÜME MODÜLÜ



$$\sin(k.L) = \sin(n.\pi) \Rightarrow k.L = n.\pi \Rightarrow \left( \sqrt{\frac{F}{EI}} \cdot L \right)^2 = (n.\pi)^2$$

$$k = \sqrt{\frac{F}{EI}}$$

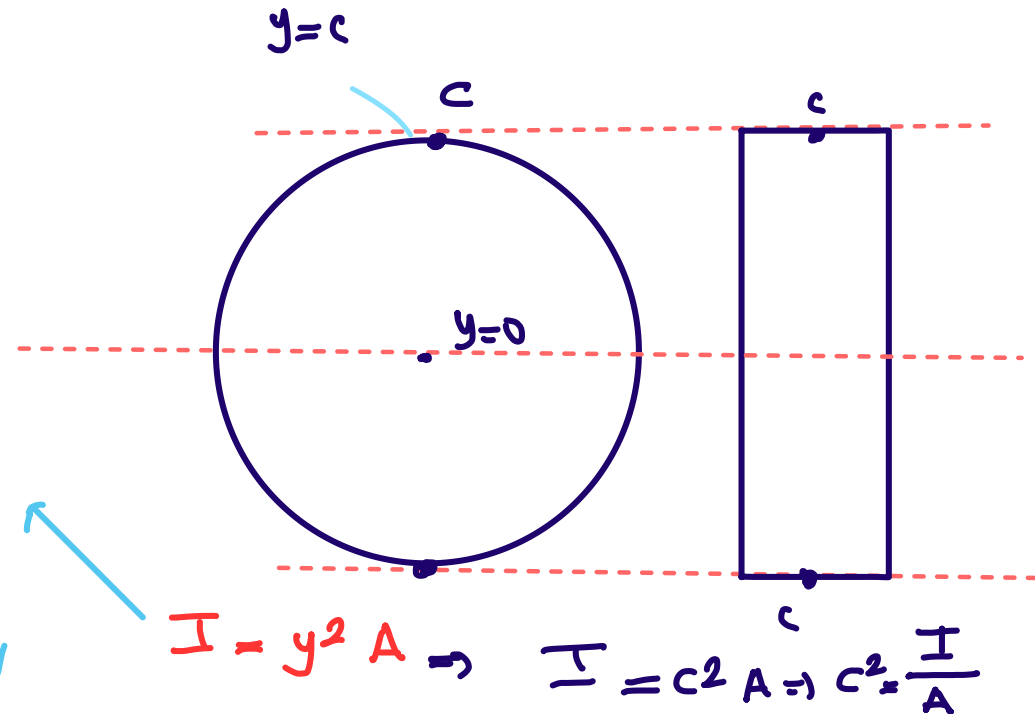
$$\Rightarrow \frac{F}{EI} \cdot L^2 = n^2 \cdot \pi^2 \Rightarrow F_{k1} = n^2 \cdot \frac{\pi^2 EI}{L^2}, \quad \text{BİZİM ELE ALDIĞIMIZ SİSTEMDE}$$

$n=1$

$$\Rightarrow \boxed{F_{k1} = \frac{\pi^2 EI}{L^2}} \quad \text{EYLEM BULULMA FORMÜLÜ}$$

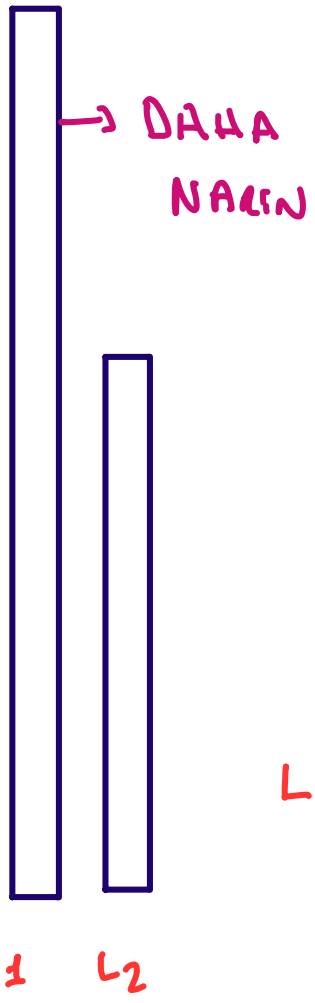
$$\sigma_{k1} = \frac{F_{k1}}{A} = \frac{\pi^2 EI c^2}{L^2 A}$$

ATALET YARI ÇAP I  
 $c^2 = \frac{I}{A}$   
 JİRASYON YARI ÇAP I

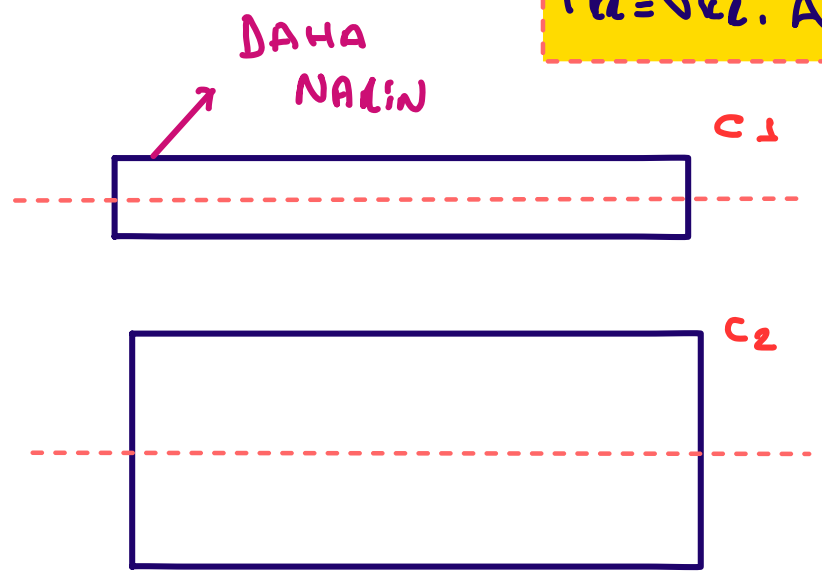


→ 
$$\sigma_{\text{ve}} = \frac{\pi^2 E}{L^2} \cdot c^2 = \frac{\pi^2 E}{(L/c)^2} = \frac{\pi^2 E}{(L_e/c)^2} \quad \frac{L_e}{c} = \pi$$

$\swarrow$  PİYDAHA ALWIR  
 $\swarrow$  EFEKTIF DUY  
 $\swarrow$  NAKILLIK OLANI



$L_1 > L_2$



$c_2 > c_1$

$$\sigma_{\text{ve}} = \frac{\pi^2 E}{\pi^2}, \quad \pi = L_e/c$$

$$F_{\text{ve}} = \sigma_{\text{ve}} \cdot A \quad c = \sqrt{\frac{I_{\text{min}}}{A}}$$

$$\sqrt{v_k} = \frac{\pi^2 E}{\pi^2}$$

