

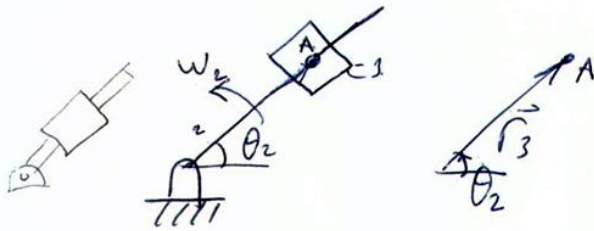
## MEKANİZMA TEKNİĞİ (6. Hafta)

### Coriolus ivmesi

### Coriolus ivmesi:

①

Coriolus ivmesi bir mekanizmanın elemanı, diğer bir eleman üzerinde hareket ettiği zaman ortaya çıkar.



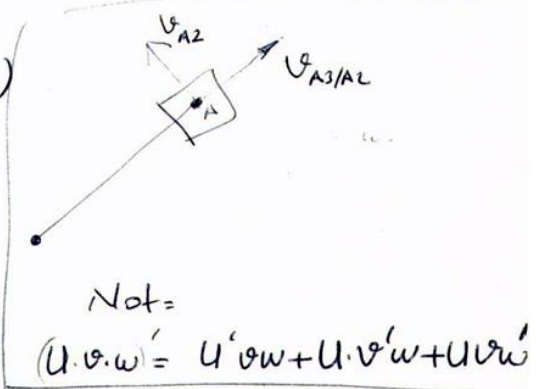
$$\vec{r}_3 = r_2 \cdot \mu(\theta_2) \quad \text{Türev alınırsa.}$$

$$\frac{d\vec{r}_3}{dt} = \vec{v}_{A3/A} = \underbrace{\dot{r}_2 \mu(\theta_2)}_{\vec{v}_{A3/A2}} + \underbrace{r_2 \cdot \dot{\theta}_2 \nu(\theta_2)}_{\vec{v}_{A2}}$$

$$\vec{v}_{A3} = \vec{v}_{A3/A2} + \vec{v}_{A2}$$

Tekrar türev alınırsa.

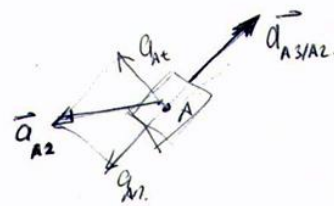
$$\begin{aligned} \frac{\partial}{\partial t} \left( \frac{\partial \vec{r}_3}{\partial t} \right) &= \vec{a}_{A3} = \ddot{r}_2 \mu(\theta_2) + \dot{r}_2 \dot{\theta}_2 \nu(\theta_2) \\ &+ \dot{r}_2 \cdot \dot{\theta}_2 \nu(\theta_2) + r_2 \cdot \ddot{\theta}_2 \nu(\theta_2) \\ &- r_2 \cdot \dot{\theta}_2^2 \mu(\theta_2) \end{aligned}$$



$$\vec{a}_{A3} = \underbrace{\ddot{r}_2 \mu(\theta_2)}_{\vec{a}_{A3/A2}} + \underbrace{2 \cdot \dot{r}_2 \cdot \dot{\theta}_2 \nu(\theta_2)}_{\vec{a}_{COR}} + \underbrace{r_2 \cdot \ddot{\theta}_2 \nu(\theta_2) - r_2 \cdot \dot{\theta}_2^2 \mu(\theta_2)}_{\vec{a}_{A2}}$$

Tümleyici ivme  
ya da Coriolus ivmesi

$$\vec{a}_{A3} = \vec{a}_{A3/A2} + \vec{a}_{COR} + \vec{a}_{A2}$$

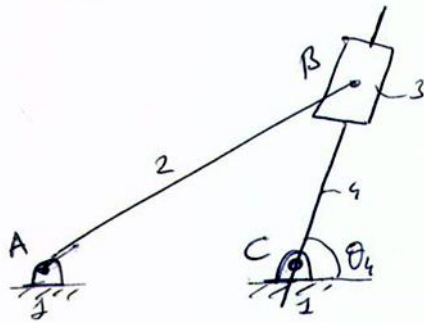


$$\begin{aligned} a_{COR} &= 2 \cdot \omega_2 \cdot \dot{r}_2 \cdot \nu(\theta_2) = 2 \cdot \omega_2 \cdot v_{A3/A2} \\ &= \perp \dot{r}_2 \mu(\theta_2) \cdot \perp \end{aligned}$$

**Örnek 3**

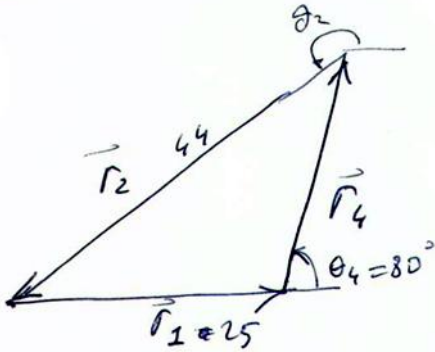
Örnek

(2)

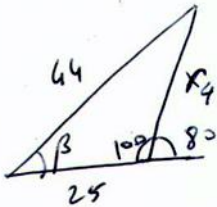


$$\left. \begin{aligned} AC &= 25 \text{ cm.} \\ AB &= 44 \text{ cm.} \\ \theta_4 &= 80^\circ \\ \omega_4 &= 20 \text{ rad/s} \end{aligned} \right\} \begin{aligned} a_B &=? \\ \alpha_2 &=? \end{aligned}$$

① Geometrik Bilinmeyenleri Bulalım.



$$\begin{array}{ccc} \underline{r_1} & \underline{r_2} & \underline{r_4} \\ \underline{\theta_1} & \underline{\theta_2} & \underline{\theta_4} \end{array}$$



$$44^2 = 25^2 + r_4^2 - 2 \cdot 25 \cdot r_4 \cdot \cos 100.$$

$$r_4^2 + 8,68 \cdot r_4 - 1311 = 0.$$

$$(r_4)_{1,2} = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \frac{-8,68 \pm \sqrt{8,68^2 - 4 \cdot 1 \cdot (-1311)}}{2 \cdot 1}$$

$$(r_4)_{1,2} = \frac{-8,68 \pm 78,93}{2} \rightarrow \begin{array}{l} -40,8 \\ \underline{\underline{35,1}} \end{array}$$

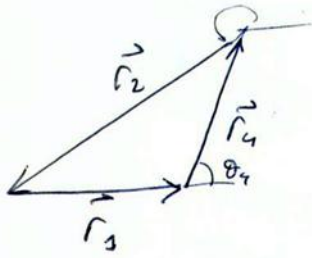
$$35^2 = 44^2 + 25^2 - 2 \cdot 44 \cdot 25 \cdot \cos \beta \quad \boxed{r_4 = 35}$$

$$\boxed{\beta = 52,8}$$

$$\theta_2 = 180 + 52 = \underline{\underline{232^\circ}} \text{ bulunur}$$

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2) Kuvvet denklemini oluşturalım.



$$\vec{r}_1 + \vec{r}_4 + \vec{r}_2 = 0$$

$$r_1 \cdot \mu(\theta_1) + r_4 \cdot \mu(\theta_4) + r_2 \cdot \mu(\theta_2) = 0..$$

3) Hız denklemini oluşturalım.

Sabitler  $r_1, r_2, \theta_1$       Değişkenler  $\theta_4, \theta_2, r_4$

$$\cancel{v(\theta_4)} / 0 + r_4 \cdot \dot{\theta}_4 \cdot \mu(\theta_4) + r_2 \cdot \dot{\theta}_2 \cdot \mu(\theta_2) = 0$$

$$r_4 \cdot \dot{\theta}_4 \cdot \mu(\theta_4) + r_4 \cdot \dot{\theta}_4 \cdot \underbrace{\mu(\theta_4)}_1 + r_2 \cdot \dot{\theta}_2 \cdot \underbrace{\mu(\theta_2)}_{\cos(\theta_2 - \theta_4)} = 0$$

$$\dot{\theta}_2 = \omega_2 = \frac{r_4 \cdot \omega_4}{44 - \cos(\theta_2 - \theta_4)} = - \frac{35 \cdot 20}{\cos(232 - 80)} = 18 \text{ rad/s}$$

$$\boxed{\dot{\theta}_2 = \omega_2 = 18 \text{ rad/s}}$$

$$\cancel{M(\theta_2)} / \frac{r_4 \cdot \mu(\theta_4) \cdot M(\theta_2)}{\cos(\theta_4 - \theta_2)} + r_4 \cdot \dot{\theta}_4 \cdot \underbrace{\mu(\theta_4)}_{\sin(\theta_2 - \theta_4)} + 0 = 0$$

$$\dot{r}_4 = v_{B3/84} = - \frac{35 \cdot 20 \cdot \sin(232 - 80)}{\cos(80 - 232)} = 420 \text{ cm/s}$$

$$\boxed{\dot{r}_4 = 420 \text{ cm/s}}$$

4) İme Denklemi oluşturalım.

(4)

$$\ddot{r}_4 \vec{m}(\theta_4) + \dot{r}_4 \ddot{\theta}_4 \vec{r}(\theta_4) + r_4 \cdot \dot{\theta}_4 \cdot \dot{\vec{r}}(\theta_4) + r_4 \cdot \dot{\theta}_4^2 \vec{m}(\theta_4)$$

$$r_2 \cdot \dot{\theta}_2 \dot{\vec{r}}(\theta_2) - r_2 \cdot \dot{\theta}_2^2 \vec{m}(\theta_2) = 0.$$

$$\vec{r}(\theta_4) / 2 \cdot \dot{r}_4 \cdot \dot{\theta}_4 \dot{\vec{r}}(\theta_4) + \dot{r}_4 \ddot{\theta}_4 \vec{r}(\theta_4) - r_4 \cdot \dot{\theta}_4^2 \vec{m}(\theta_4) + r_2 \cdot \dot{\theta}_2 \dot{\vec{r}}(\theta_2) - r_2 \cdot \dot{\theta}_2^2 \vec{m}(\theta_2) = 0$$

$$2 \cdot \dot{r}_4 \cdot \omega_4 + r_2 \cdot \alpha_2 \cdot \cos(\theta_2 - \theta_4) - r_2 \cdot \omega_2^2 \cdot \sin(\theta_2 - \theta_4) = 0$$

$$\alpha_2 = \frac{44 \cdot 18^2 \cdot \sin(232 - 80) - 2 \cdot 420 \cdot 20}{44 \cdot \cos(232 - 80)}$$

$$\alpha_2 = 260 \text{ rad/s}^2$$

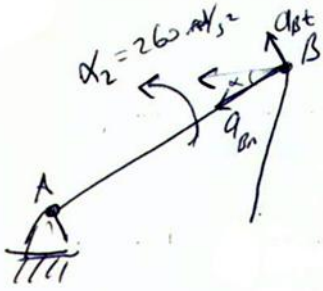
$\vec{m}(\theta_2) /$

$$2 \cdot \dot{r}_4 \cdot \dot{\theta}_4 \sin(\theta_2 - \theta_4) + \dot{r}_4 \ddot{\theta}_4 \cos(\theta_4 - \theta_2) - r_4 \cdot \omega_4^2 \cdot \cos(\theta_4 - \theta_2) + 0 - r_2 \cdot \omega_2^2 \cdot 1 = 0$$

$$\ddot{r}_4 = \frac{35 \cdot 20^2 \cdot \cos(80 - 232) + 44 \cdot 18^2 - 2 \cdot 420 \cdot 20 \cdot \sin(232 - 80)}{\cos(80 - 232)}$$

$$\ddot{r}_4 = 6786 \text{ cm/s}^2$$

???



2 nokta elemanı bir arada  
 hareket ediyor. olduğu için aynı  
 dönüş hızına B noktasının  
 dönüş hızı katlayca bulabiliriz.

5

$$a_{Bn} = \omega_2^2 \cdot AB = 18 \cdot 44 = 142,56 \text{ m/s}^2$$

$$a_{Bt} = \alpha_2 \cdot AB = 260 \cdot 44 = 114,40 \text{ m/s}^2$$

$$a_{B2} = \sqrt{142,56^2 + 114,40^2} = 182,78 \text{ m/s}^2$$

$$\tan \alpha = \frac{a_{Bt}}{a_{Bn}} = \frac{114,40}{142,78} \Rightarrow \alpha = 38^\circ$$