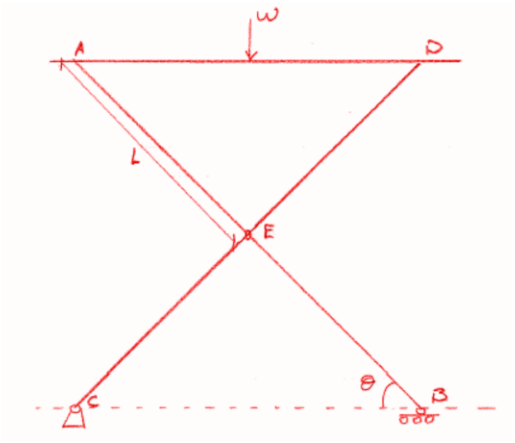
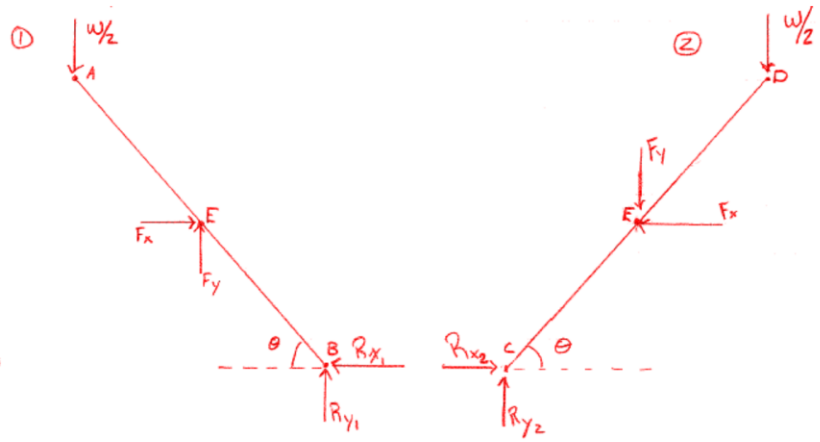
Preračun škarjastega mehanizma – Statika

Free Body Diagrams:





Static Equations

① Ⓐ $\Sigma M_B \circlearrowleft + = \emptyset = w/2 \times 2L \times \cos(\theta) - F_y \times L \times \cos(\theta) - F_x \times L \times \sin(\theta)$

Ⓑ $\Sigma F_{x\rightarrow +} = \emptyset = F_x - R_{x_1}$

Ⓒ $\Sigma F_{y\uparrow +} = \emptyset = -w/2 + F_y + R_{y_1}$

② Ⓓ $\Sigma M_A \circlearrowleft + = \emptyset = -w/2 \times 2L \times \cos(\theta) - F_y \times L \times \cos(\theta) + F_x \times L \times \sin(\theta)$

Ⓔ $\Sigma F_{x\rightarrow +} = \emptyset = -F_x + R_{x_2}$

Ⓕ $\Sigma F_{y\uparrow +} = \emptyset = -w/2 - F_y + R_{y_2}$

6 equations, 6 unknown variables

Ⓐ $0 = w/2 \times 2L \times \cos(\theta) - F_y \times L \times \cos(\theta) - F_x \times L \times \sin(\theta)$

$$F_y = \frac{-w/2 \times 2L \times \cos(\theta)}{L \times \cos(\theta)} + \frac{F_x \times L \times \sin(\theta)}{L \times \cos(\theta)}$$

$$F_y = -w + F_x \times \tan(\theta)$$

Ⓓ $0 = -w/2 \times 2L \times \cos(\theta) - F_y \times L \times \cos(\theta) + F_x \times L \times \sin(\theta$

$$F_x = \frac{w/2 \times 2L \times \cos(\theta)}{L \times \sin(\theta)} - \frac{F_y \times L \times \cos(\theta)}{L \times \sin(\theta)}$$

$$F_x = \frac{w}{\tan(\theta)} - \frac{F_y}{\tan(\theta)}$$

By substitution (eq. A into eq. D)

$$F_x = \frac{w}{\tan(\theta)} - \left(\frac{-w}{\tan(\theta)} - \frac{F_x \times \tan(\theta)}{\tan(\theta)} \right)$$

$$F_x = \frac{2w}{\tan(\theta)} + F_x$$

$$F_x = \frac{w}{\tan(\theta)}$$

If, $-R_{x_1} + F_x = 0$ and $R_{x_2} - F_x = \emptyset$

$R_{x_1} = F_x$ $R_{x_2} = F_x$

Therefore,

$$\boxed{F_x = R_{x_1} = R_{x_2} = \frac{w}{\tan(\theta)}}$$

(A) $-\omega + F_x \times \tan(\theta) = F_y$

(D) $\frac{\omega}{\tan(\theta)} - \frac{F_y}{\tan(\theta)} = F_x$

$$F_y = -\omega + \left(\frac{\omega}{\tan(\theta)} - \frac{F_y}{\tan(\theta)}\right) \times \tan(\theta)$$

$F_y = -F_y$

$F_y = \emptyset$

For calcating upward reactions

(F) $\emptyset = -\omega/2 - \overset{=0}{F_y} + R_{y_2}$

$$\boxed{\omega/2 = R_{y_2}}$$

(C) $\emptyset = -\omega/2 + \overset{=0}{F_y} + R_{y_1}$

$$\boxed{\omega/2 = R_{y_1}}$$

In conclusion,

$R_{x_1} = R_{x_2} = \frac{\omega}{\tan(\theta)}$ $\qquad F_x = \frac{\omega}{\tan(\theta)}$

$R_{y_1} = R_{y_2} = \omega/2$

$F_y = 0$