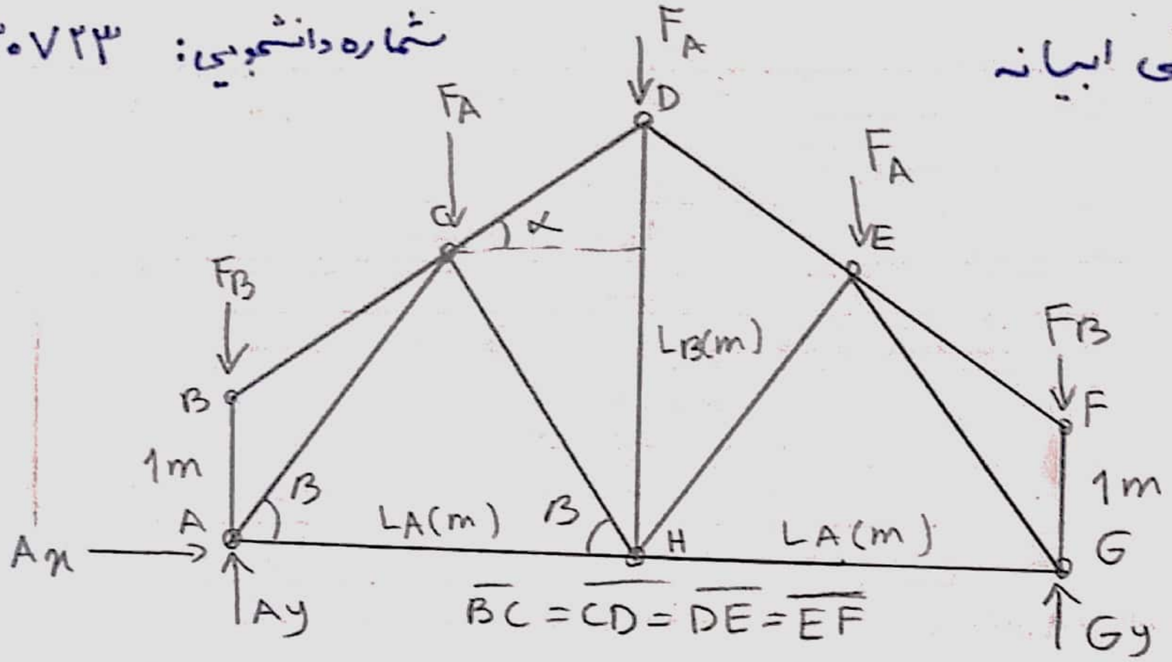
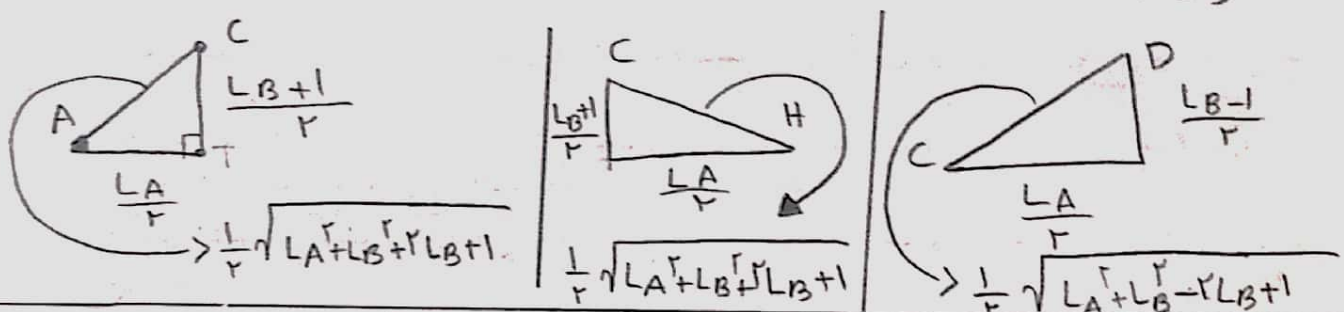
شماره دانشجویی: ۹۹۳۰۷۲۳ محمد ملکی ابیانه





$$\Sigma F_x=0 \Rightarrow A_x=0$$

$$\Sigma M_A=0 \Rightarrow G_y\times(۲L_A)-F_A\left(\frac{L_A}{۲}\right)-F_A L_A-F_A\left(\frac{۳}{۲}L_A\right)-F_B\times(۲L_A)=0 \Rightarrow G_y=\frac{۳F_A+۲F_B}{۲}$$

$$\Sigma F_y=0 \Rightarrow A_y+\left(\frac{۳F_A+۲F_B}{۲}\right)-۳F_A-۲F_B=0 \Rightarrow A_y=\frac{۳F_A+۲F_B}{۲}$$

B $\begin{cases} \Sigma F_x=0 \Rightarrow P_{BC}\cos\alpha=0 \Rightarrow P_{BC}=0=P_{FE} \\ \Sigma F_y=0 \Rightarrow P_{AB}-F_B-\cancel{P_{BC}(\sin\alpha)}=0 \Rightarrow P_{AB}=F_B=P_{FG} \end{cases}$

A

$$\Sigma F_y=0 \Rightarrow A_y-\underbrace{P_{AB}}_{F_B}-P_{AC}\times(\sin\beta)=0 \Rightarrow P_{AC}=\frac{A_y-F_B}{\sin\beta}=\frac{\frac{۳F_A+۲F_B}{۲}-F_B}{\frac{\frac{L_B+1}{۲}}{\frac{۱}{۲}\sqrt{L_A^۲+L_B^۲+۲L_B+۱}}}$$

$$\Rightarrow P_{AC}=\frac{۳F_A\sqrt{L_A^۲+L_B^۲+۲L_B+۱}}{۲(L_B+1)}=P_{GE}$$

$$\Sigma F_x=0 \Rightarrow P_{AH}=P_{AC}\times\cos(\beta) \Rightarrow P_{AH}=\frac{۳F_A\cancel{\sqrt{L_A^۲+L_B^۲+۲L_B+۱}}}{۲(L_B+1)}\times\frac{\frac{L_A}{\cancel{۲}}}{\cancel{\frac{۱}{۲}}\cancel{\sqrt{L_A^۲+L_B^۲+۲L_B+۱}}}$$

$$\Rightarrow P_{AH}=\frac{۳F_A L_A}{۲(L_B+1)}=P_{GH}$$

C
$$\begin{cases} \sum F_x = 0 \Rightarrow P_{AC}\times\cos\beta - P_{CD}\times(\cos\alpha) - P_{CH}\times(\cos\beta) = 0 \\ \qquad\qquad P_{AH} \\ \sum F_y = 0 \Rightarrow P_{AC}\times\sin\beta + P_{CH}\times\sin\beta - P_{CD}\times\sin\alpha - F_A = 0 \end{cases}$$

$$\Rightarrow \begin{cases} \dfrac{3F_A L_A}{2(L_B+1)} - P_{CD}\times\dfrac{\frac{L_A}{2}}{\frac{1}{2}\sqrt{L_A^2+L_B^2-2L_B+1}} - P_{CH}\times\dfrac{\frac{L_A}{2}}{\frac{1}{2}\sqrt{L_A^2+L_B^2+2L_B+1}} = 0 \\ \dfrac{3F_A\sqrt{L_A^2+L_B^2+2L_B+1}}{2(L_B+1)}\times\dfrac{\frac{L_B+1}{2}}{\frac{1}{2}\sqrt{L_A^2+L_B^2+2L_B+1}} + P_{CH}\times\dfrac{\frac{L_B+1}{2}}{\frac{1}{2}\sqrt{L_A^2+L_B^2-2L_B+1}} - F_A = 0 \end{cases}$$

$$\Rightarrow \begin{cases} \dfrac{3F_A L_A}{2(L_B+1)} - P_{CD}\times\dfrac{L_A}{\sqrt{L_A^2+L_B^2-2L_B+1}} - P_{CH}\times\dfrac{L_A}{\sqrt{L_A^2+L_B^2+2L_B+1}} = 0 \\ \dfrac{F_A}{2} + P_{CH}\times\dfrac{L_B+1}{\sqrt{L_A^2+L_B^2+2L_B+1}} - P_{CD}\times\dfrac{L_B-1}{\sqrt{L_A^2+L_B^2-2L_B+1}} = 0 \end{cases}$$

$$\Rightarrow P_{CH} = \left[\frac{3F_A}{2(L_B+1)} - \frac{P_{CD}}{\sqrt{L_A^2+L_B^2-2L_B+1}}\right]\times\sqrt{L_A^2+L_B^2+2L_B+1} \qquad (I)$$

$$\xrightarrow{(I)} \frac{F_A}{2} + \left[\frac{3F_A}{2(L_B+1)} - \frac{P_{CD}}{\sqrt{L_A^2+L_B^2-2L_B+1}}\right]\times(L_B+1) - P_{CD}\times\frac{(L_B-1)}{\sqrt{L_A^2+L_B^2-2L_B+1}} = 0$$

$$\Rightarrow P_{CD} = \frac{F_A\sqrt{L_A^2+L_B^2-2L_B+1}}{L_B} = P_{DE}$$

با جایگذاری P_{CD} در یکی از معادلات $\Rightarrow$

$$P_{CH} = \frac{F_A L_B - 2F_A}{2L_B(L_B+1)}\times\sqrt{L_A^2+L_B^2+2L_B+1} = P_{EH}$$

D
$$\begin{cases} \sum F_y = 0 \Rightarrow F_A + P_{CD}\times\sin\alpha + P_{ED}\times\sin\alpha + P_{DH} = 0 \\ \sum F_x = 0 \Rightarrow P_{CD}\times\cancel{\cos\alpha} = P_{ED}\times\cancel{\cos\alpha} \Rightarrow P_{CD} = P_{ED} \;\star \end{cases}$$

$$\Rightarrow P_{DH} = F_A - 2P_{CD}\times\sin\alpha \Rightarrow F_A - 2\times\frac{F_A\cancel{\sqrt{L_A^2+L_B^2-2L_B+1}}}{L_B}\times\frac{\frac{L_B-1}{2}}{\frac{1}{2}\cancel{\sqrt{L_A^2+L_B^2-2L_B+1}}} = 0$$

$$\Rightarrow P_{DH} = F_A - \frac{2F_A(L_B-1)}{L_B} = \frac{2F_A - F_A L_B}{L_B}$$

$$P_{ACx} = \frac{3F_A\cancel{\sqrt{L_A^2+L_B^2+2L_B+1}}}{2(L_B+1)} \times \frac{\frac{L_A}{\cancel{4}}}{\frac{1}{\cancel{4}}\cancel{\sqrt{L_A^2+L_B^2+2L_B+1}}} = \frac{3F_AL_A}{2(L_B+1)} = P_{GEx}$$

$$P_{ACy} = \frac{3F_A\cancel{\sqrt{L_A^2+L_B^2+2L_B+1}}}{2(L_B+1)} \times \frac{\frac{L_B+1}{\cancel{4}}}{\frac{1}{\cancel{4}}\cancel{\sqrt{L_A^2+L_B^2+2L_B+1}}} = \frac{3F_A}{2} = P_{GEy}$$

$$P_{AHx} = \frac{3F_AL_A}{2(L_B+1)} = P_{GHx} \Big/ P_{AHy} = 0 = P_{GHy}$$

$$P_{CDx} = \frac{F_A\cancel{\sqrt{L_A^2+L_B^2-2L_B+1}}}{L_B} \times \frac{\frac{L_A}{\cancel{4}}}{\frac{1}{\cancel{4}}\cancel{\sqrt{L_A^2+L_B^2-2L_B+1}}} = \frac{F_AL_A}{L_B} = P_{DEx}$$

$$P_{CDy} = \frac{F_A\cancel{\sqrt{L_A^2+L_B^2-2L_B+1}}}{L_B} \times \frac{\frac{L_B-1}{\cancel{4}}}{\frac{1}{\cancel{4}}\cancel{\sqrt{L_A^2+L_B^2-2L_B+1}}} = \frac{F_A(L_B-1)}{L_B} = P_{DEy}$$

$$P_{CHx} = \frac{(F_AL_B-2F_A)}{2(L_B+1)(L_B)} \times \cancel{\sqrt{L_A^2+L_B^2+2L_B+1}} \times \frac{\frac{L_A}{\cancel{4}}}{\frac{1}{\cancel{4}}\cancel{\sqrt{L_A^2+L_B^2+2L_B+1}}} = \frac{L_A(F_AL_B-2F_A)}{2\times L_B\times(L_B+1)}$$

$$= P_{EHx}$$

$$P_{CHy} = \frac{(F_AL_B-2F_A)\times\cancel{\sqrt{L_A^2+L_B^2+2L_B+1}}}{2(L_B+1)(L_B)} \times \frac{\frac{L_B+1}{\cancel{4}}}{\frac{1}{\cancel{4}}\cancel{\sqrt{L_A^2+L_B^2+2L_B+1}}} = \frac{F_AL_B-2F_A}{2L_B} = P_{EHy}$$

$$P_{DHx} = 0 \Big/ P_{DHy} = \frac{2F_A-F_AL_B}{L_B}$$

$A_y = G_y = \dfrac{3F_A + 2F_B}{2}$ / $A_x = 0$ / $P_{BC} = 0 = P_{FE}$ (IV) / $P_{AB} = F_B = P_{FG}$ (III) / $G_x = 0$

در واقع [illegible]

$$* \; P_{AC} = \frac{3F_A\sqrt{L_A^2 + L_B^2 + 2L_B + 1}}{2(L_B+1)} = P_{GE} \quad (I)$$

$$* \; P_{AH} = \frac{3F_A L_A}{2(L_B+1)} = P_{GH} \quad (II)$$

(I) و (II) و (III) و (IV) و (V) و (VI) و (VII) $\Rightarrow F_{magnitude}$

$$* \; P_{CD} = \frac{F_A\sqrt{L_A^2 + L_B^2 - 2L_B + 1}}{L_B} = P_{DE} \quad (V)$$

$$* \; P_{CH} = \frac{F_A L_B - 2F_A}{2(L_B+1)(L_B)} \times \sqrt{L_A^2 + L_B^2 + 2L_B + 1} = P_{EH} \quad (VI)$$

$$* \; P_{DH} = F_A - \frac{2F_A(L_B-1)}{L_B} = \frac{2F_A - F_A L_B}{L_B} \quad (VII)$$

$P_{ACx} = \dfrac{3F_A L_A}{2(L_B+1)}$ / $P_{ACy} = \dfrac{3F_A\cancel{(L_B+1)}}{2\cancel{(L_B+1)}} = \dfrac{3F_A}{2}$

$= P_{GEx}$ $\qquad P_{GEy}$

$P_{AHx} = \dfrac{3F_A L_A}{2(L_B+1)}$ / $P_{AHy} = 0 \rightarrow P_{GHy}$

P_{GHx}

$P_{CDx} = \dfrac{F_A L_A}{L_B}$ / $P_{CDy} = \dfrac{F_A(L_B-1)}{L_B}$

P_{DEx} $\qquad P_{DEy}$

$P_{CHx} = \dfrac{L_A(F_A L_B - 2F_A)}{2 \times L_B \times (L_B+1)}$ / $P_{CHy} = \dfrac{\cancel{(L_B+1)}(F_A L_B - 2F_A)}{2 \times L_B \times \cancel{(L_B+1)}} = \dfrac{F_A L_B - 2F_A}{2L_B}$

P_{EHx} $\qquad P_{EHy}$

$P_{DHx} = 0$ / $P_{DHy} = \dfrac{2F_A - F_A L_B}{L_B}$