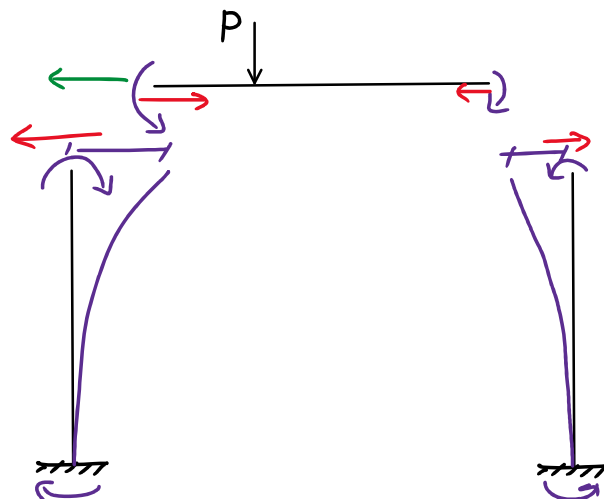
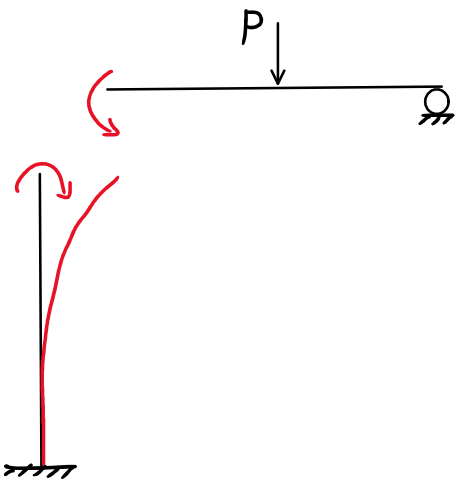
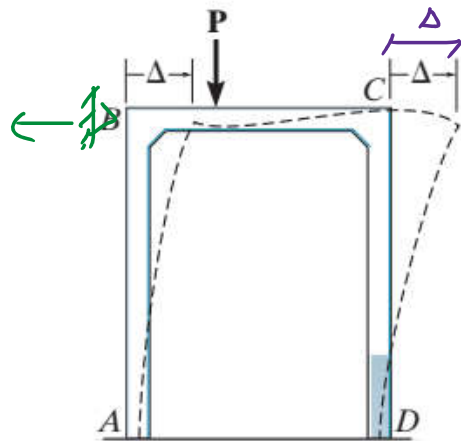
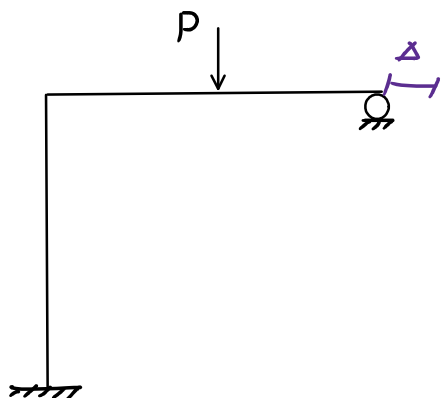
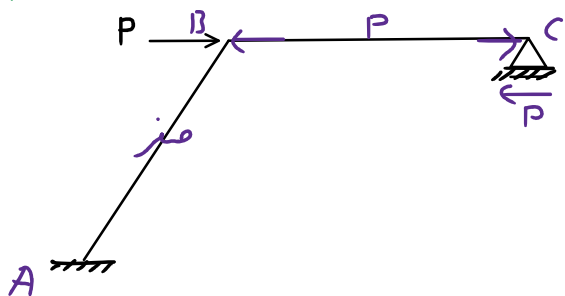


تشخیص جهت تقریبی  $\Delta$  در قاب‌ها :



**نکته مهم:** اگر در سازه درجه آزادی وجود نداشته باشد و یا بارگذاری به گونه‌ای باشد که  $\Delta = 0$  باشد؛ در صورتی که بارها (متمرکز، گره‌ها و وارد شود) (در طول عضو بار وارد نشود)

کنتر و برش در لبه اعضا صفر است  $M = 0$ ،  $V = 0$  و فقط نیروی محدود داریم که رفتار خرابی

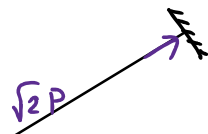


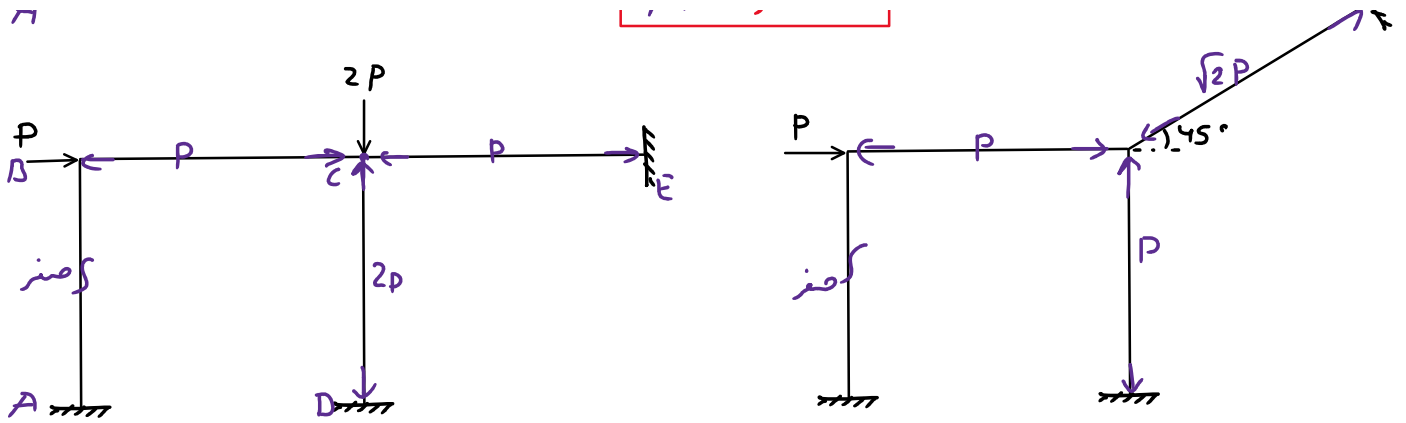
$$M_{BA} + M_{BC} = 0$$

$$\frac{3EI}{L}(\theta_B) + \frac{2EI}{L}(2\theta_B) = 0 \rightarrow \theta_B = 0$$

$$M = 0, V = 0$$

2P





درجه آزادی نداریم

$$FEM = 0 \rightarrow \theta = 0 \rightarrow M = 0 \rightarrow V = 0$$

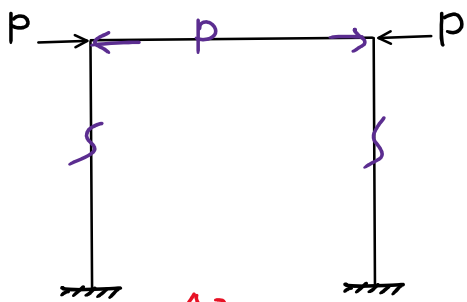
بیان توزیع نگر

$$\sum M_B = 0 \rightarrow \frac{2EI}{L}(2\theta_B) + \frac{2EI}{L}(2\theta_B + \theta_C) = 0$$

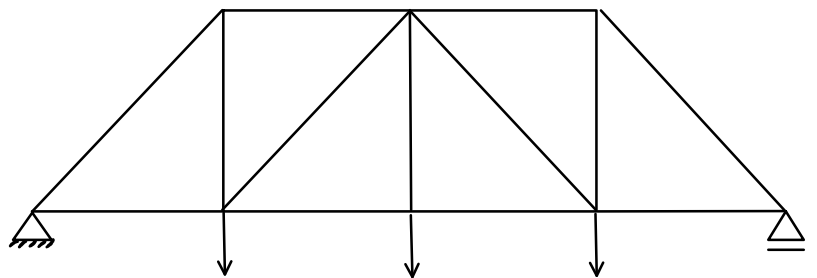
بیان صیب-انف

$$\sum M_C = 0 \rightarrow \frac{2EI}{L}(2\theta_C + \theta_B) + \frac{2EI}{L}(2\theta_C) + \frac{2EI}{L}(2\theta_C) = 0$$

$$\begin{cases} \alpha_1 \theta_B + \beta_1 \theta_C = 0 \\ \alpha_2 \theta_B + \beta_2 \theta_C = 0 \end{cases} \rightarrow \begin{cases} \theta_B = 0 \\ \theta_C = 0 \end{cases} \rightarrow M_{ij} = 0 \rightarrow V = 0$$



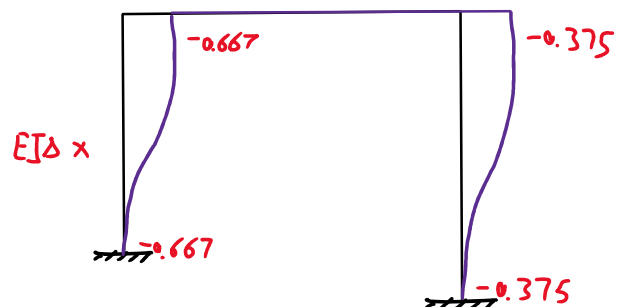
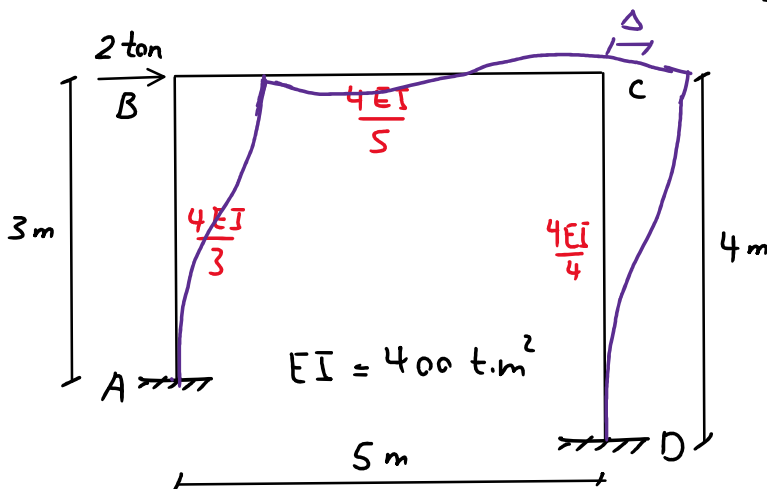
$$\Delta = 0 \\ M = V = 0$$



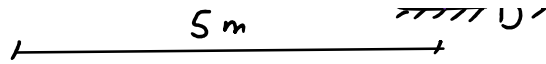
درجه آزادی نداریم. بارها دربره ما.  $FEM = 0 \rightarrow \theta = 0 \rightarrow M = 0 \rightarrow V = 0$

منظ بنور محوری

مثال: نیروهای داخلی  $\Delta$  و  $\theta$  را به دست آرید.

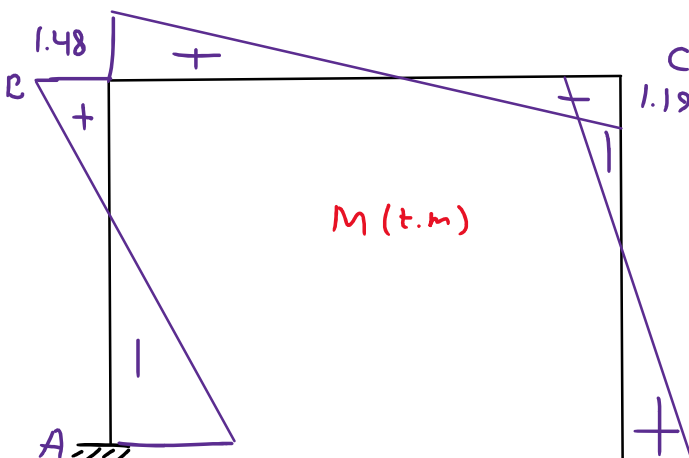
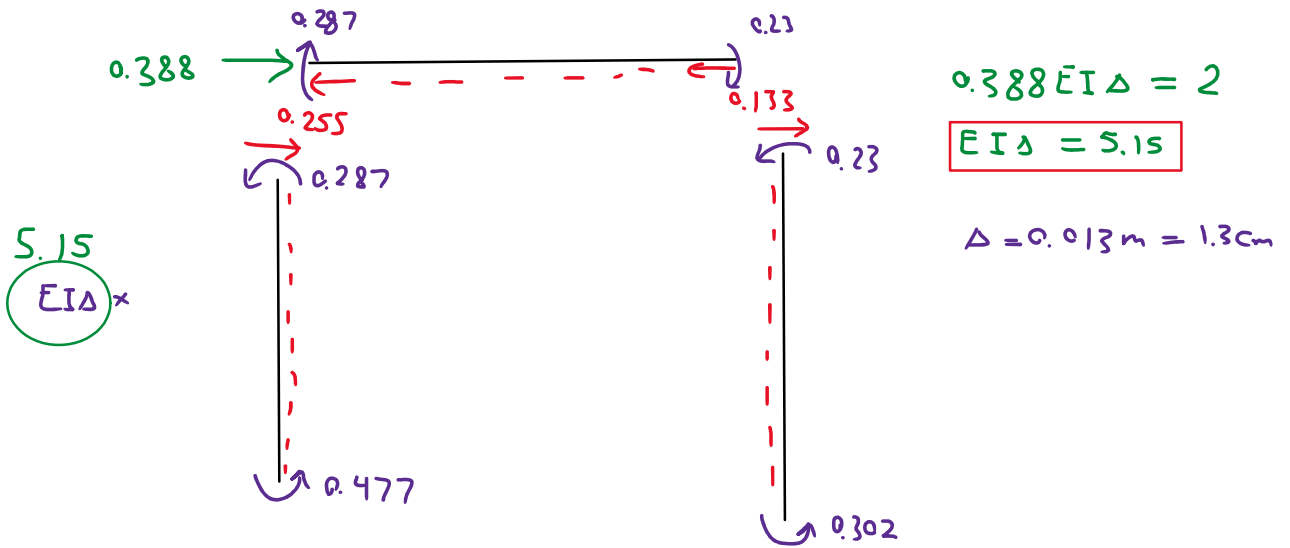
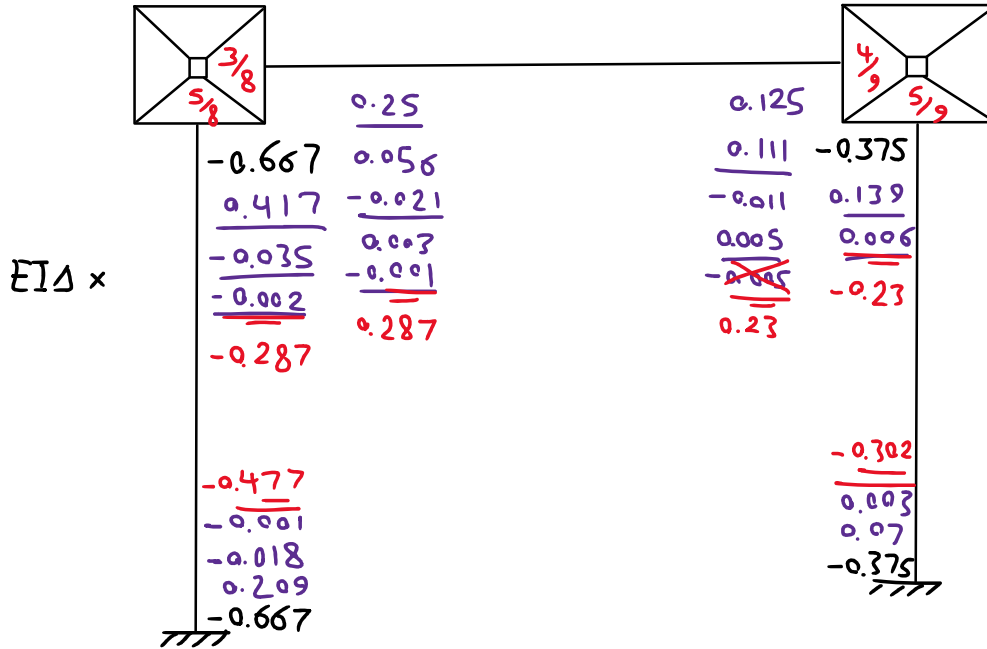


$$FEM: -\frac{6EI}{3^2} \Delta = -0.667 EI \Delta$$



$$FEM: -\frac{6EI\Delta}{3^2} = -0.667 EI\Delta$$

$$-\frac{6EI\Delta}{4^2} = -0.375 EI\Delta$$

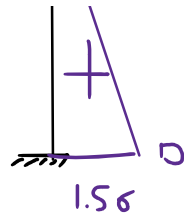
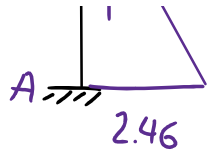


$$M_{BA} = \frac{2EI}{L} (2\theta_B - \frac{3\Delta}{L})$$

$$-1.48 = \frac{4EI}{3} \theta_B - \frac{6}{3^2} \times 5.15 \rightarrow EI\theta_B = 1.47$$

$$\theta_B = 0.0037 rad$$

$$M_{CB} = \frac{2EI}{L} (2\theta_C - \frac{3\Delta}{L})$$



$$M_{cD} = \frac{2EI}{L} \left( 2\theta_c - \frac{3\Delta}{L} \right)$$

$$-1.19 = \frac{4}{4} EI \theta_c - \frac{6}{4^2} \times 5.15 \rightarrow \boxed{EI \theta_c = 0.74}$$

$$\theta_c = 0.0018 \text{ rad}$$