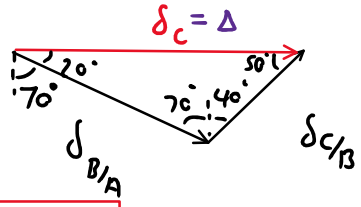
Slope-Deflection 9

Thursday, March 14, 2024 14:18

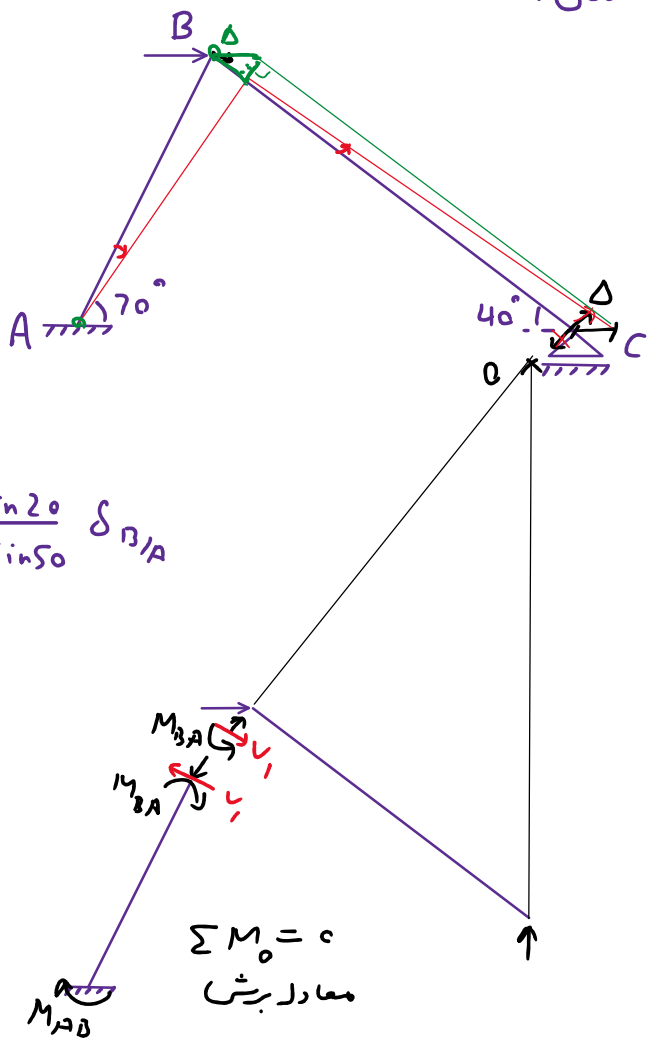
نوشتن درجات آزادی وابسته

مثال :

$$\vec{\delta}_C = \vec{\delta}_{B/A} + \vec{\delta}_{C/B}$$



$$\frac{\delta_{B/A}}{\sin 50} = \frac{\delta_{C/B}}{\sin 20}$$



$$\uparrow y: -\delta_{B/A}\sin 20 + \delta_{C/B}\sin 50 = 0 \rightarrow \delta_{C/B} = \frac{\sin 20}{\sin 50}\delta_{B/A}$$

$$\rightarrow x: \delta_{B/A}\cos 20 + \delta_{C/D}\cos 50 = \Delta$$

$$\delta_{B/A}\cos 20 + \frac{\cos 20}{\cos 50}\cos 50\,\delta_{B/A} = \Delta$$

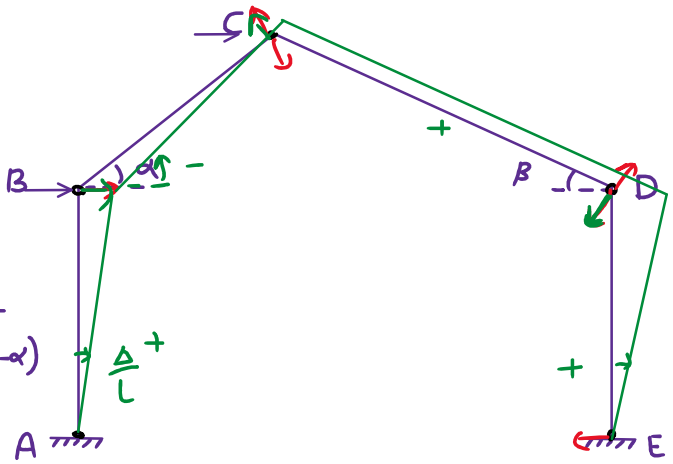
$$\boxed{\delta_{B/A} = 1.12\Delta} \qquad \boxed{\delta_{C/B} = 0.5\Delta}$$

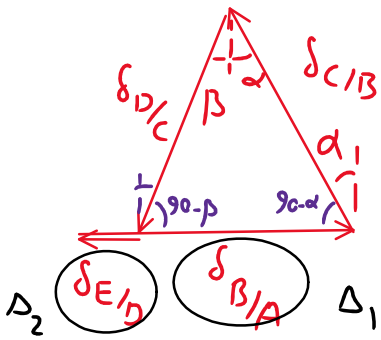
$$M_{AB} = \frac{2EI}{L}\left(-3\,\frac{1.12\Delta}{L}\right)$$

$$M_{BC} = \frac{2EI}{L}\left(+3\,\frac{0.5\Delta}{L}\right)$$

مثال :

$$\delta_E = \delta_A + \delta_{B/A} + \delta_{C/B} + \delta_{D/C} + \delta_{E/D}$$





$$\frac{\Delta_1 - \Delta_2}{\sin(\alpha+\beta)} = \frac{\delta_{CB}}{L\sin(90-\beta)} = \frac{\delta_{DC}}{\sin(90-\alpha)}$$

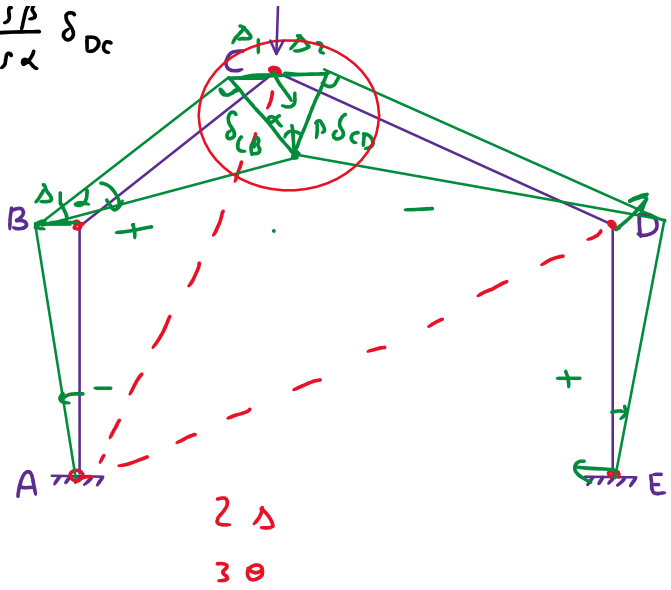
$$y: \delta_{CB}\cos\alpha - \delta_{DC}\cos\beta = 0 \rightarrow \delta_{CB} = \frac{\cos\beta}{\cos\alpha}\delta_{DC}$$

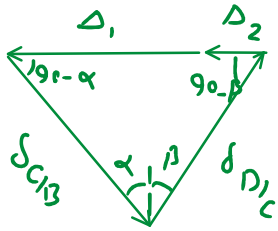
$$y:\ \delta_{CB}\cos\alpha - \delta_{DC}\cos\beta = 0 \rightarrow \delta_{CB} = \frac{\cos\beta}{\cos\alpha}\delta_{DC}$$

$$x:\ \Delta_1 - \delta_{CB}\sin\alpha - \delta_{DC}\sin\beta - \Delta_2 = 0$$

$$\left(-\frac{\cos\beta}{\cos\alpha}\sin\alpha - \sin\beta\right)\delta_{DC} = \Delta_2 - \Delta_1$$

$$\boxed{\delta_{DC} = \frac{\Delta_1 - \Delta_2}{\sin\beta + \frac{\cos\beta}{\cos\alpha}\cos\alpha}}$$

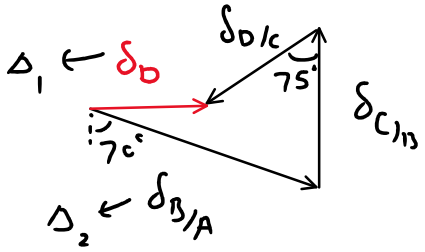


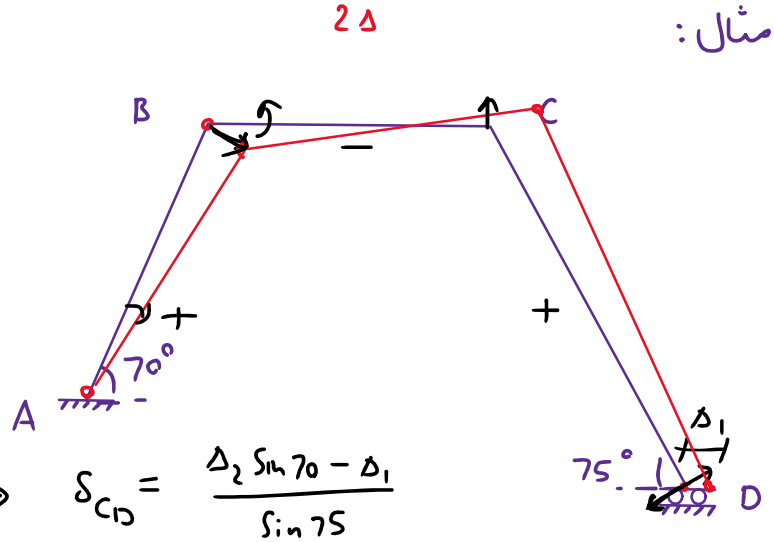


$$\frac{\Delta_1 + \Delta_2}{\sin(\alpha+\beta)} = \frac{\delta_{C/B}}{\sin(90-\beta)} = \frac{\delta_{D/C}}{\sin(90-\alpha)}$$

مثال:

$$\delta_D = \delta_A + \delta_{B/A} + \delta_{C/B} + \delta_{D/C}$$



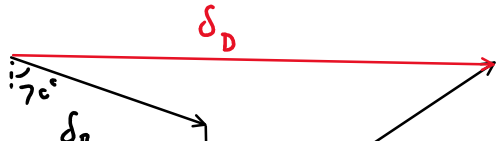


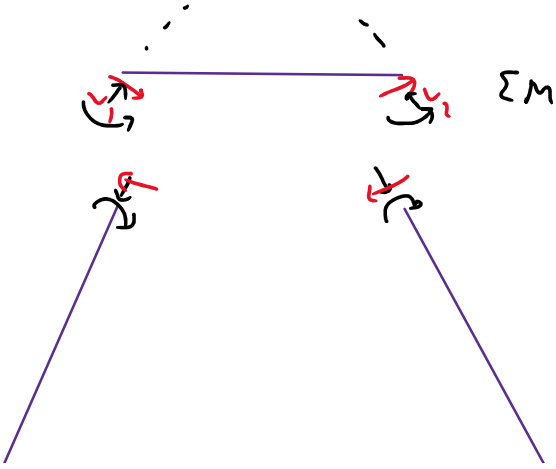
$$\rightarrow x:\ \Delta_2\sin 70 + 0 - \delta_{CD}\sin 75 = \Delta_1 \rightarrow \delta_{CD} = \frac{\Delta_2\sin 70 - \Delta_1}{\sin 75}$$

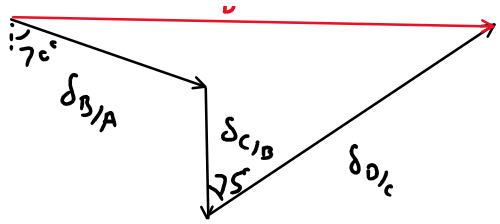
$$\uparrow y:\ -\Delta_2\cos 70 + \delta_{CB} - \delta_{CD}\cos 75 = 0 \rightarrow \delta_{CB} = \Delta_2\cos 70 + (0.97\Delta_2 - 1.04\Delta_1)\cos 75$$

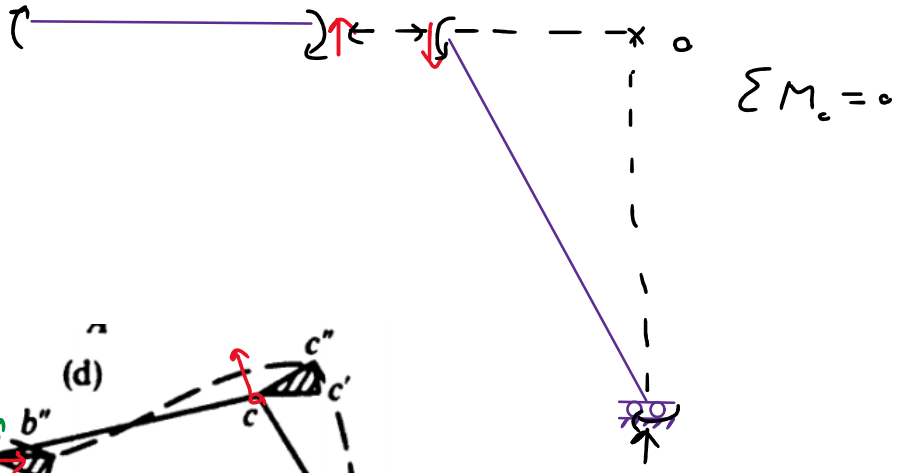
$$\boxed{\delta_{CD} = 0.97\Delta_2 - 1.04\Delta_1}$$

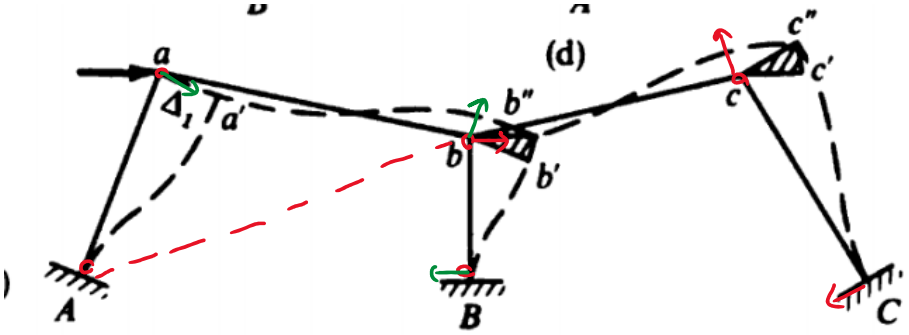
$$\boxed{\delta_{CB} = 0.59\Delta_2 - 0.27\Delta_1}$$





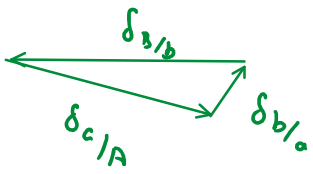






1 Δ

$$\delta_B = \delta_{C/A} + \delta_{b/a} + \delta_{B/b}$$



$$\delta_C = \delta_{b/A} + \delta_{C/b} + \delta_{C/c}$$