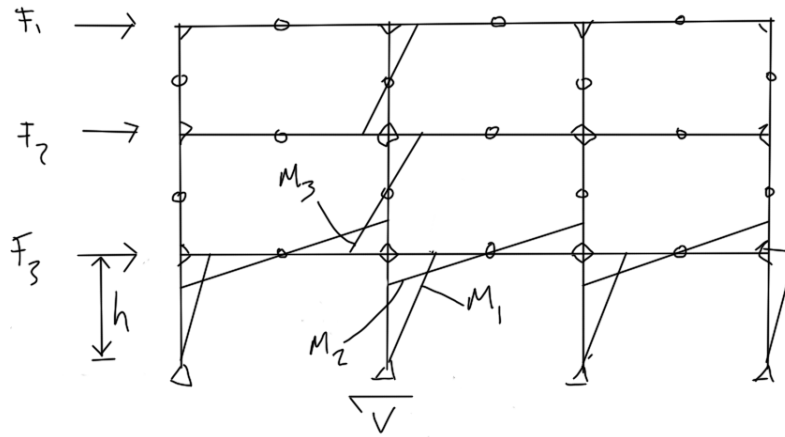


## Portal method



Internal support

$$V = \frac{\sum F}{n-1}$$

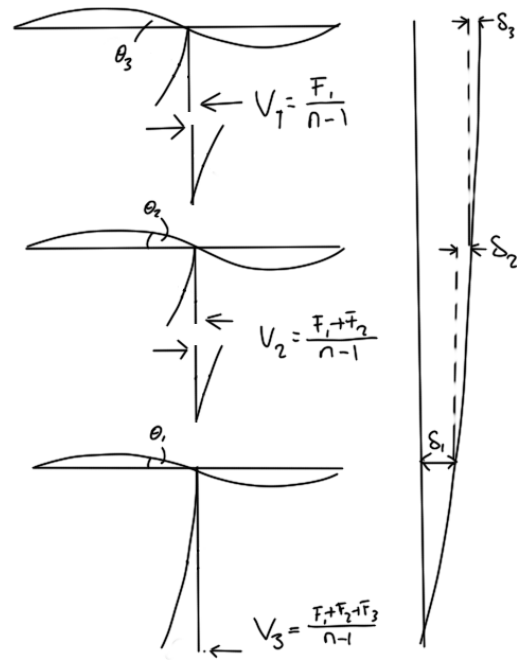
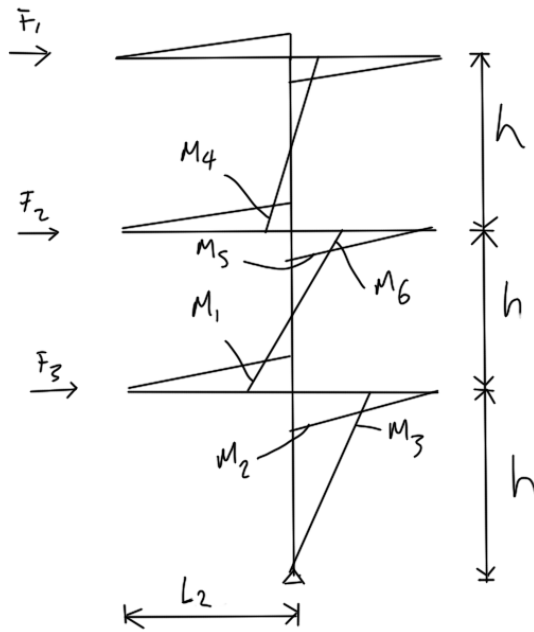
Outer support shear

$$V = \frac{\sum F}{2(n-1)}$$

$$M_1 = V \times h$$

$$M_3 = V \times \frac{h}{2}$$

$$M_2 = \frac{M_1 + M_3}{2}$$



$$\theta \approx \frac{M_2 L_2}{3EI} = \text{Xrads}$$

Deflection at lowest level

$$\delta_1 \approx \frac{V_3 h^3}{3EI} + \frac{M_2 L_2}{3EI} \times h = \text{Xmm}$$

Deflection at mid level

$$\delta_2 \approx 2 \times \frac{V_2 \left(\frac{h}{2}\right)^3}{3EI} + \frac{M_2 L_2}{3EI} \times \frac{h}{2} + \frac{M_5 L_2}{3EI} \times \frac{h}{2} = \text{Xmm}$$

ETC, summate for total deflection at top of column