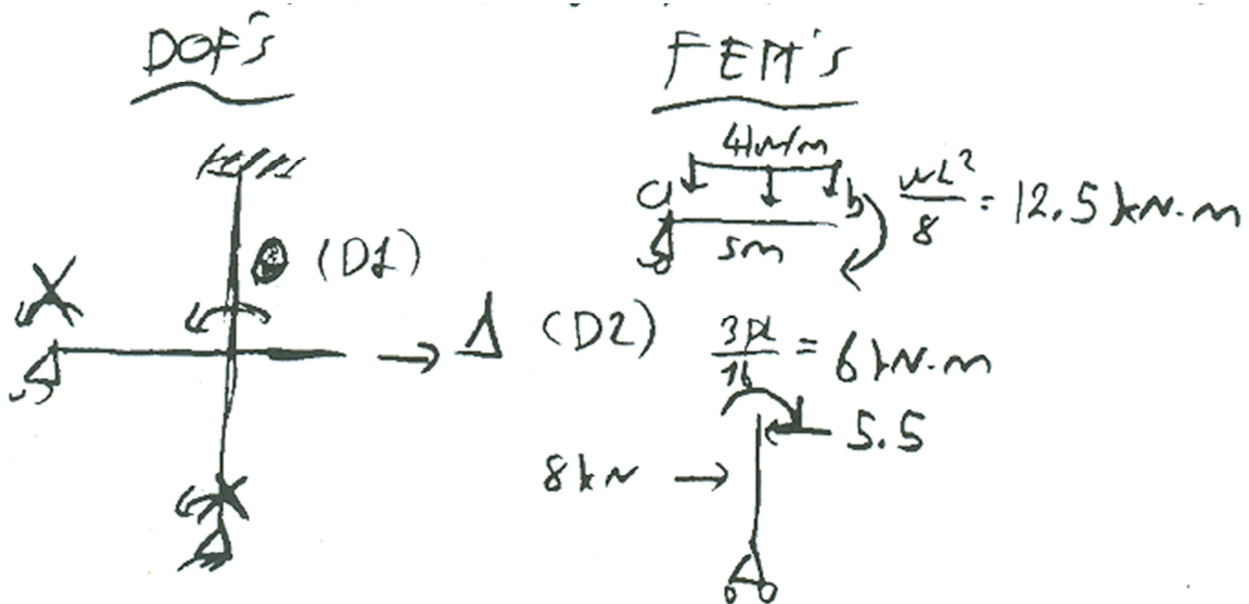


Using general stiffness method, determine the moment at support D. Members are axially rigid and EI is constant.

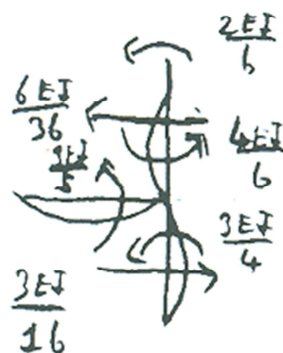


General Stiffness Method

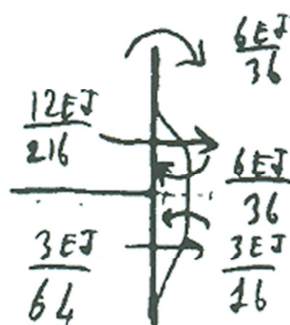
$$f = f^A - f^{FEF} = \begin{Bmatrix} -7.5 \\ 0 \end{Bmatrix} - \begin{Bmatrix} -12.5 - 6 \\ -5.5 \end{Bmatrix} = \begin{Bmatrix} 11 \\ 5.5 \end{Bmatrix}$$

K. matrix

$$\theta = 1, \Delta = 0$$



$$\theta = 0, \Delta = 1$$



$$k_{11} = \frac{4EI}{6} + \frac{3EI}{5} + \frac{3EI}{4} = \frac{121}{60}$$

$$k_{12} = \frac{3EI}{16} - \frac{6EI}{36} = \frac{1EI}{48}$$

$$k_{21} = -\frac{6EI}{36} + \frac{3EI}{16} = \frac{1EI}{48}$$

$$k_{22} = \frac{12EI}{216} + \frac{3EI}{64} = \frac{59EI}{576}$$

$$\begin{Bmatrix} \theta \\ \Delta \end{Bmatrix} = \frac{1}{EI} \begin{bmatrix} 121/60 & 1/48 \\ 1/48 & 59/576 \end{bmatrix}^{-1} \begin{Bmatrix} 11 \\ 5.5 \end{Bmatrix} = \frac{1}{EI} \begin{Bmatrix} 4.91 \\ 52.7 \end{Bmatrix}$$

$$M_{db} = \frac{2EI}{6} \left(\frac{4.91}{EI} - \frac{52.7}{2EI} \right) = -7.15 \text{ kN.m}$$