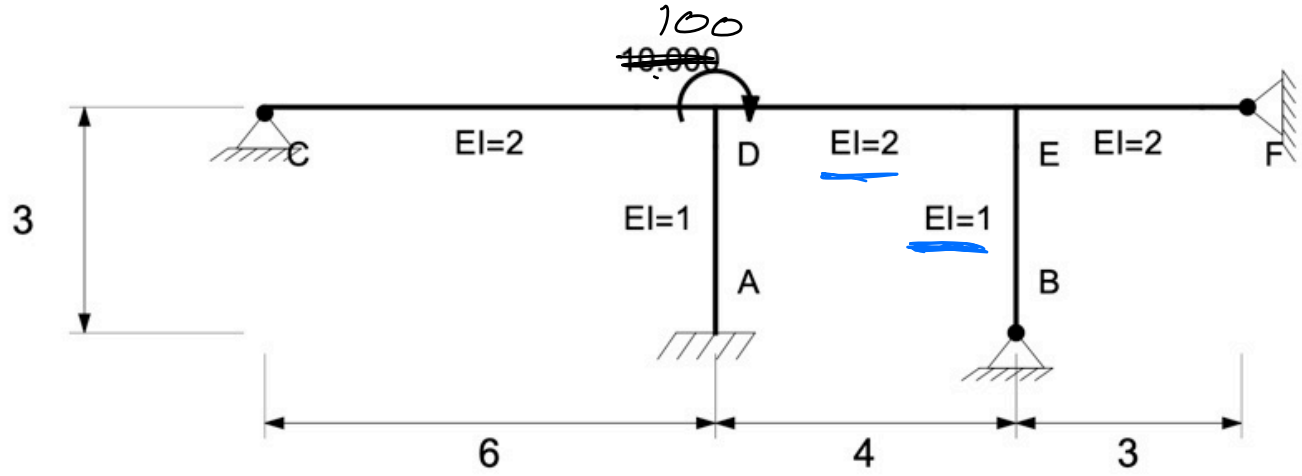
CIE 418: Lecture 34, Nov 8 & 10

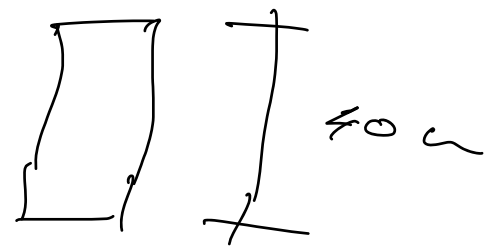


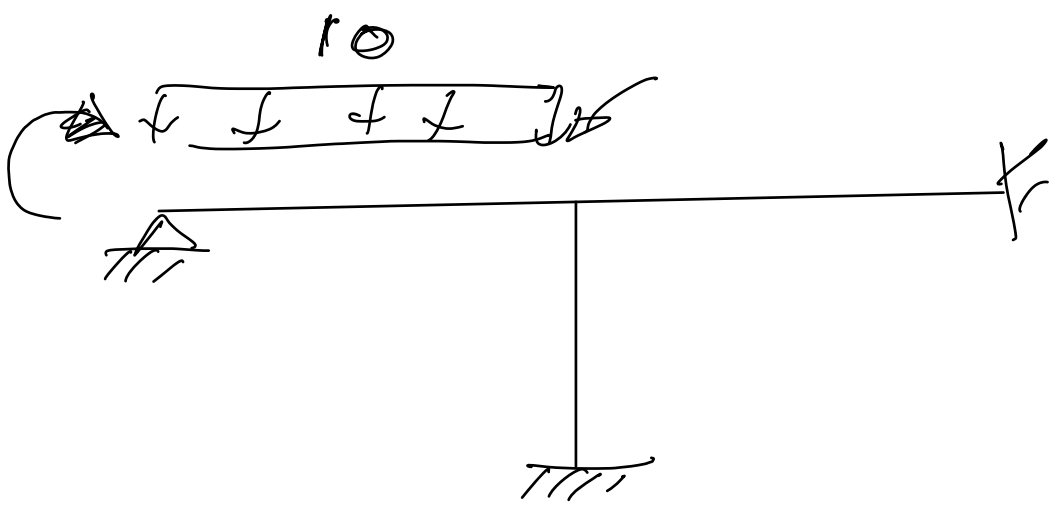
1.832

EI

200 GPa

10's of thousand cm⁴

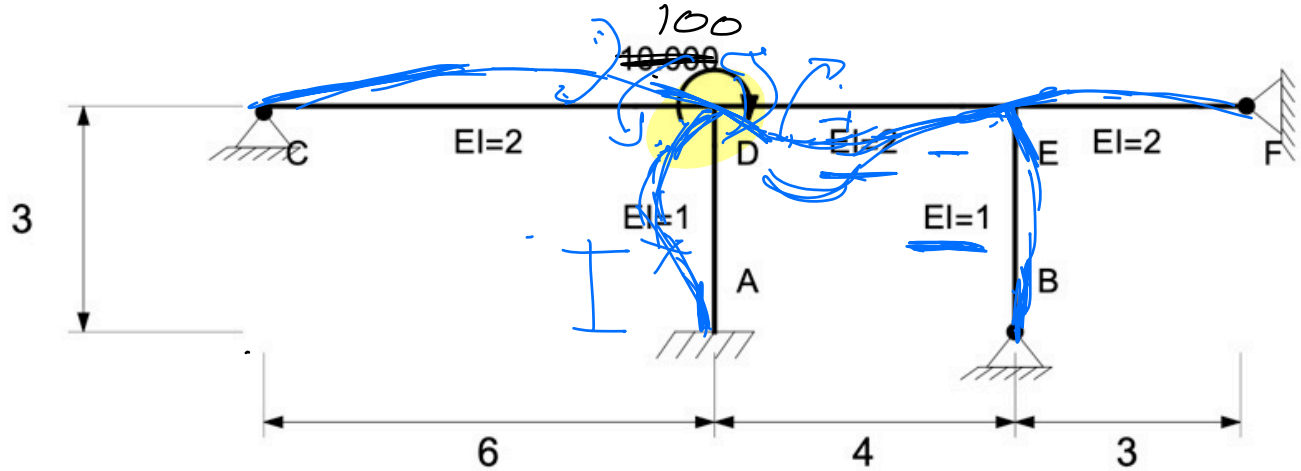


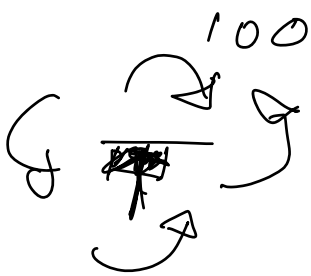


Observations

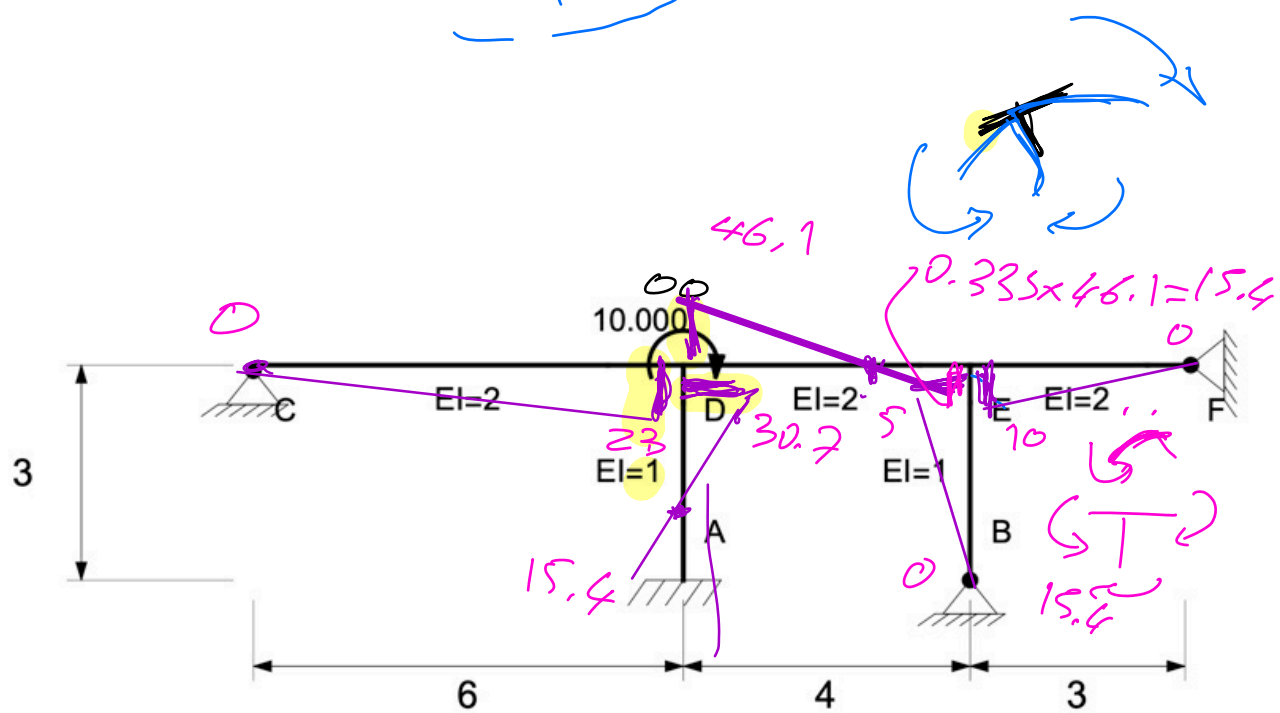
- Normalize EI's by smallest value to get easy to use numbers (round if needed)

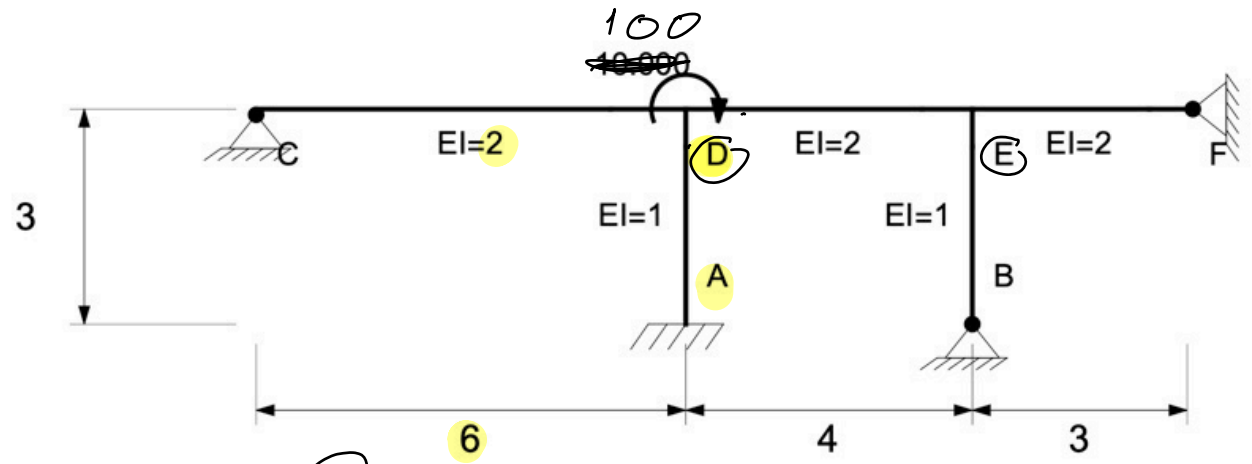
Example: distributing a moment

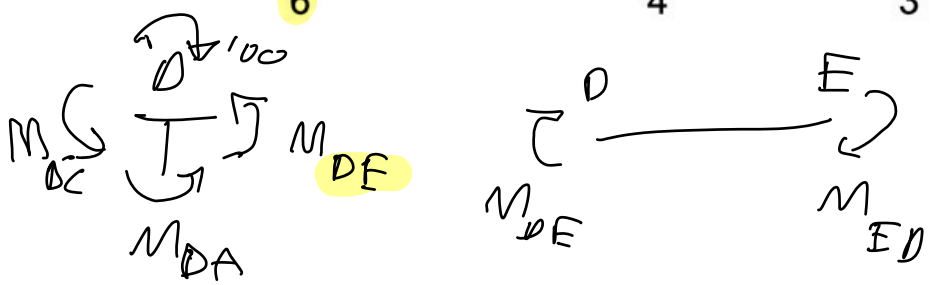




$100 = \Sigma M_{members}$







Distribute external moment to connecting members

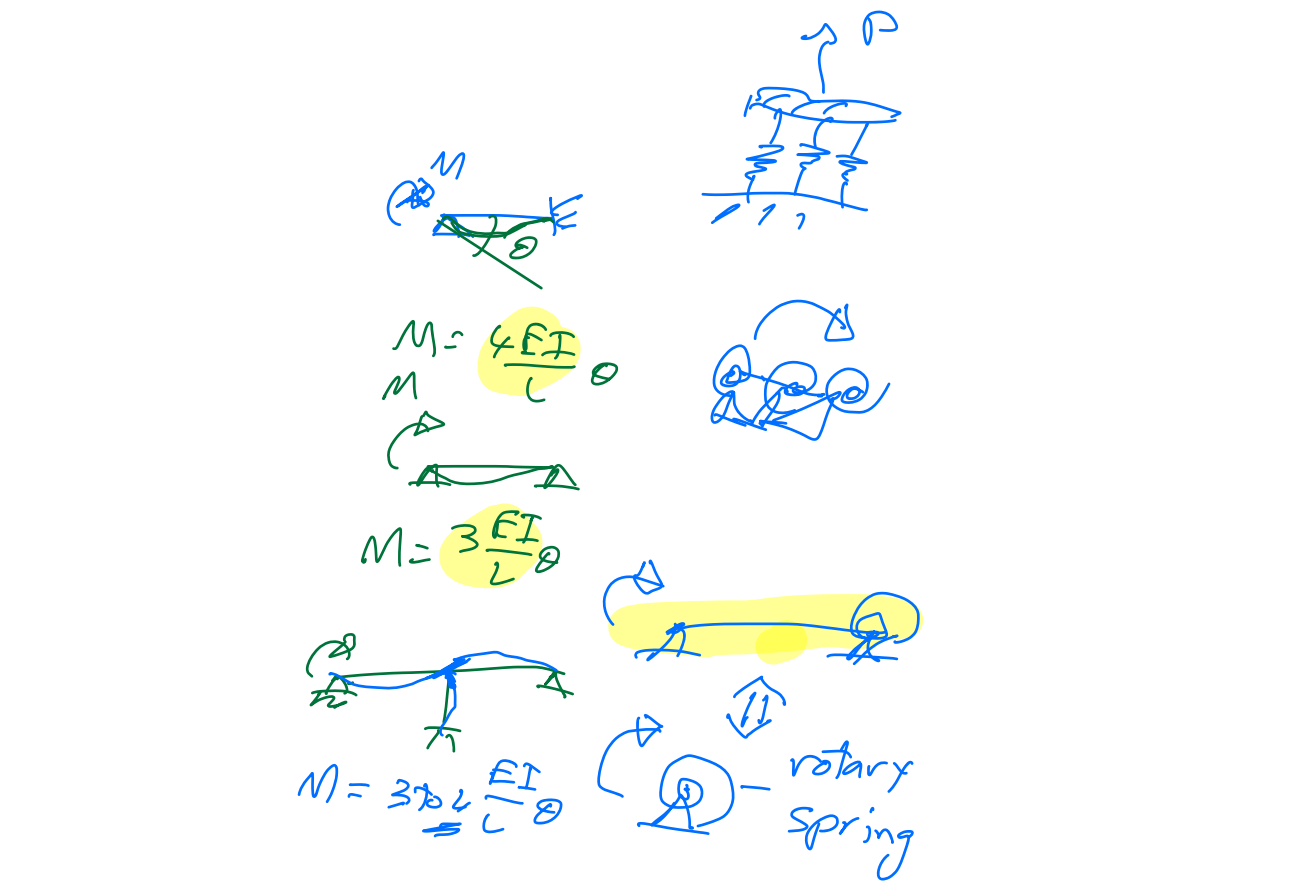
M_{app}

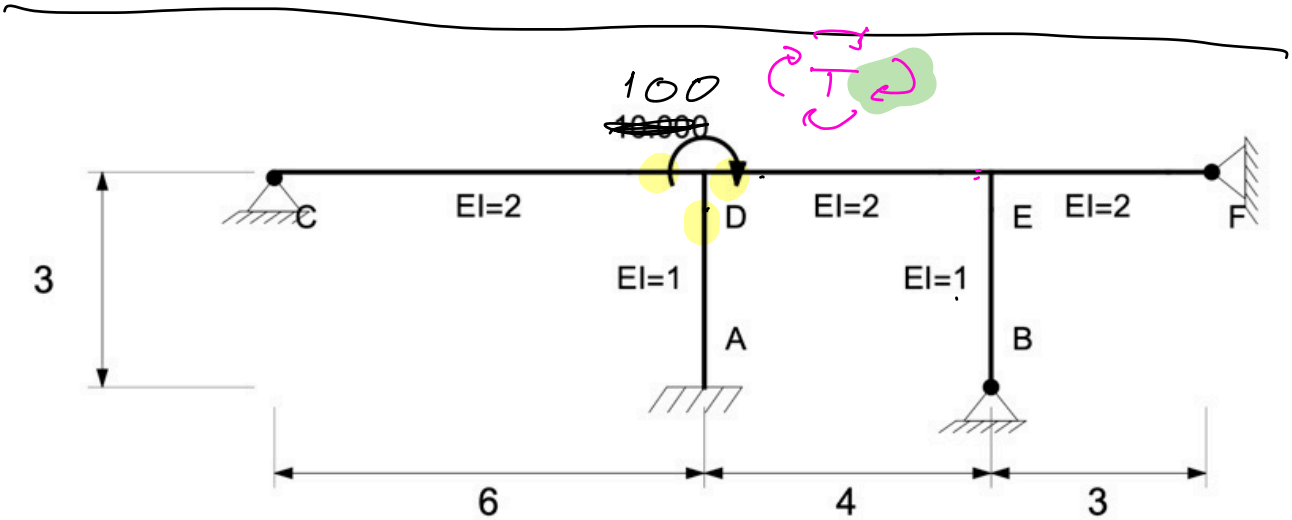
$$M_{DE} = \frac{4\frac{2}{4}}{4\frac{2}{4} + 4\frac{1}{3} + 3\times\frac{2}{6}} \times 100 \doteq 0.461 \times 100 = 46.1$$

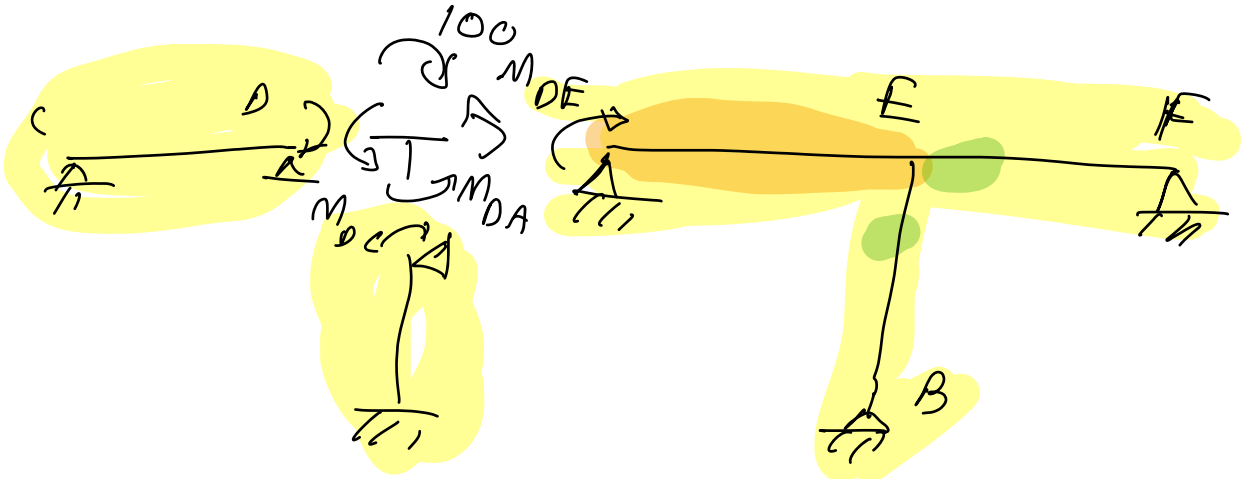
$$M_{DA} = \frac{4\times\frac{1}{2}}{4\frac{2}{4} + 4\frac{1}{3} + 3\times\frac{2}{6}} \times 100 = 0.307 \times 100 = 30.7$$

$$M_{DC} = \frac{3\times\frac{2}{6}}{4\frac{2}{4} + 4\frac{1}{3} + 3\times\frac{2}{6}} \times 100 \doteq 0.230 \times 100 = 23.0$$

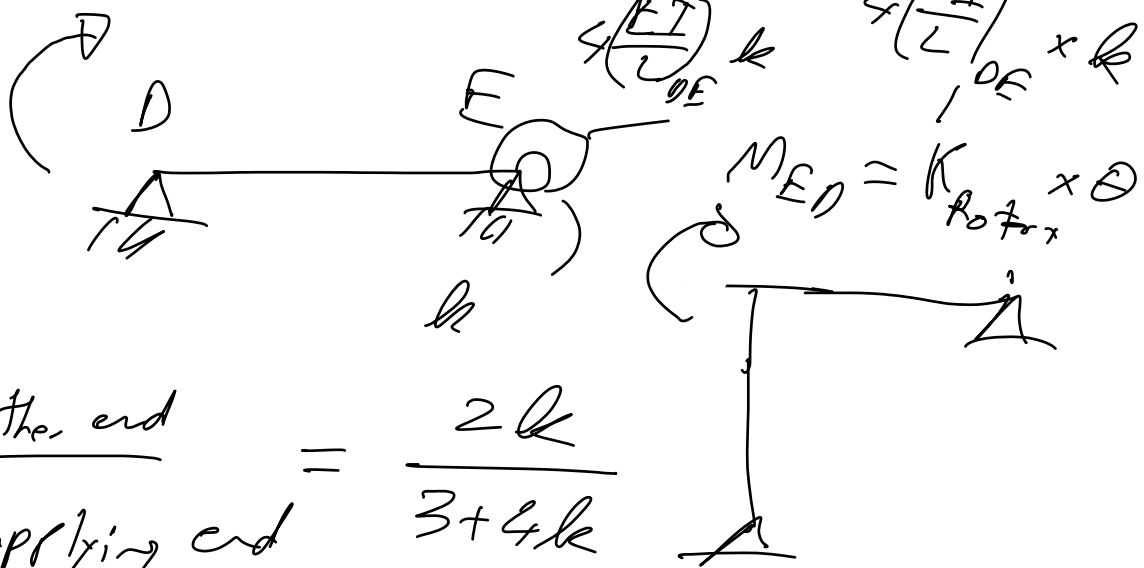
$$\Sigma = 100$$


M
θ
M = 4EI/L θ
M
M = 3EI/L θ
M = 3kL EI/L θ
rotary spring


100
10000
T
C
D
E
F
EI=2
EI=2
EI=2
EI=1
EI=1
A
B
3
6
4
3

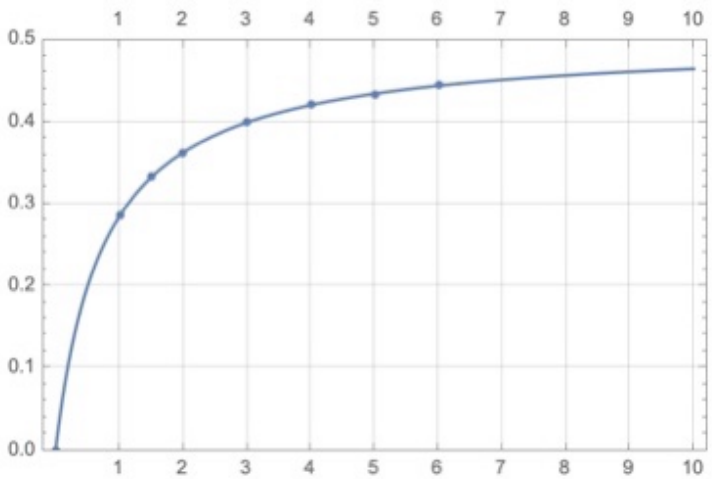


$M_{DE} = 46.1$



$$\frac{M_{other\ end}}{M_{applying\ end}} = \frac{2k}{3+4k}$$

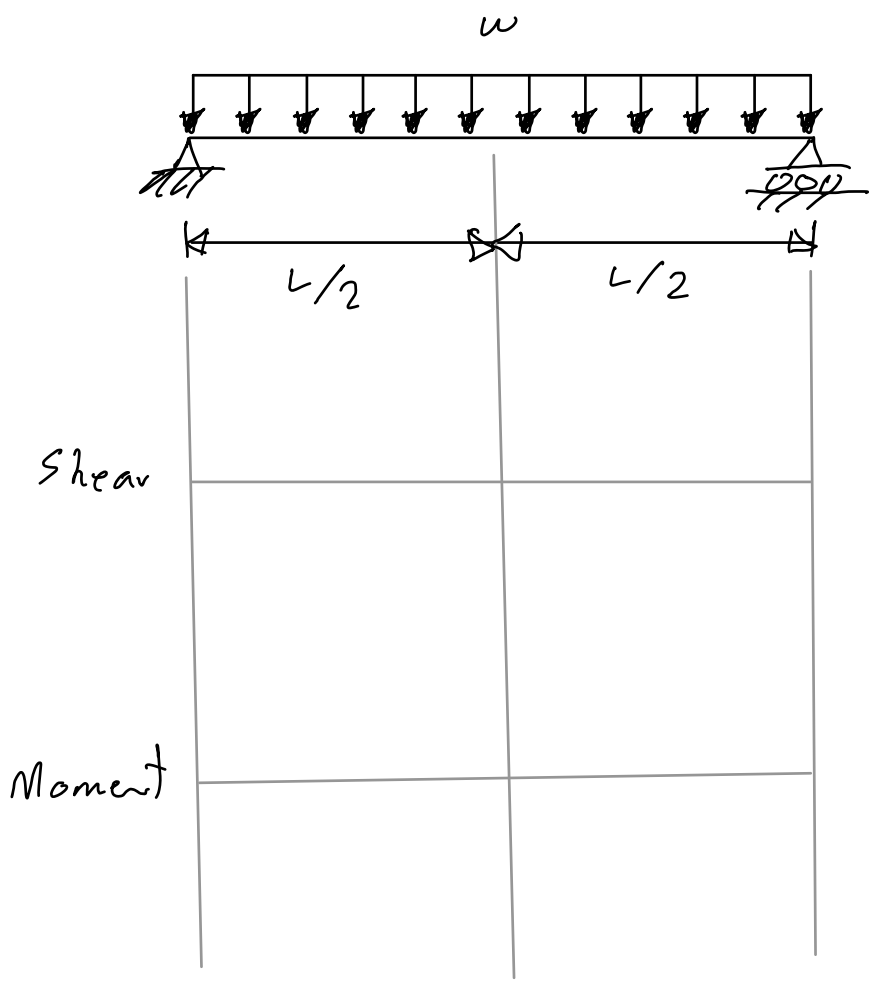
Carry over Moment



rotary stiffness factor

$$k = \frac{3 \times \frac{2}{3} + 3 \times \frac{1}{3}}{4 \times \frac{2}{4}} = 1,5$$

$$\frac{2k}{3+4k} = 0,333$$


w
L/2
L/2
Shear
Moment