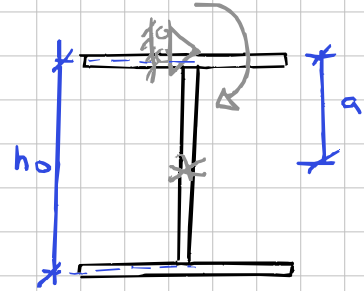


09 - Eccentric compressive torsional buckling

Compressed collectors are often only restrained at the top flange.



From AISC Steel construction manual Eq. C-E4-1 (p. 16.1-314):

$$F_{et} = w \left[\frac{\pi^2 E I_y}{L_e^2} \left[\frac{h_o^2}{4} + a^2 \right] + GJ \right] \frac{1}{A \bar{r}_o^2}, \quad w = 0.9$$

This is very similar to the centered equation, extra terms are in blue. Two methods to adjust your models:

Method #1: Modify E and G Locally.

$$E_{red} = 0.9 \left[\frac{h_o^2}{4} + a^2 \right] E \quad G_{red} = 0.9 G$$

Method #2: Modify L_e Locally and G globally.

Since G is seldom used in governing calculations, set the global G value to $0.9 G \rightarrow G_{red} = 0.9 G$

EXTRA TERMS

$$\frac{1}{L_{teq}^2} = \frac{1}{L_e^2} \cdot 0.9 \left[\frac{h_o^2}{4} + a^2 \right] = \frac{1}{L_e^2} \cdot 0.9 \left[\frac{h_o^2 + 4a^2}{4} \right]$$

$$L_{teq} = L_e \sqrt{\frac{1}{0.9} \left[\frac{4}{h_o^2 + 4a^2} \right]}, \quad \text{where the sqrt term} \leq 1.0$$