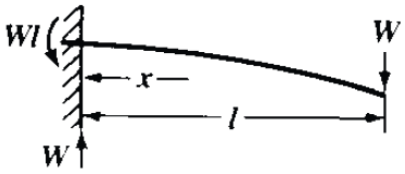
Case 1: constant drill pipe



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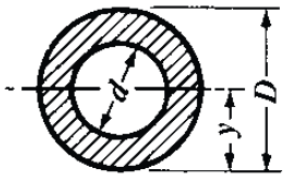
Modulus of Elasticity $E := 30 \cdot 10^6 psi$

Load $W := -1000 lbf$

Some distance as indicated $x := 10 ft$

Some distance as indicated $L := 10 ft$

Finding Moment of Inertia:



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Outside Diameter $D := \left(6 + \frac{5}{8}\right) in$

Inside Diameter $d := 5.901 in$

Moment of Inertia $I := \frac{\pi\left(D^4 - d^4\right)}{64} = 35.04 \cdot in^4$

section modulus of the cross-section of the beam $Z := \pi \frac{\left(D^4 - d^4\right)}{32 \cdot D} = 10.578 \cdot in^3$

Stress at x $s := \frac{W}{Z}(L - x) = 0 \cdot ksi$

Stress at mount $s := \frac{(W \cdot L)}{Z} = -11.344 \cdot ksi$

Deflection $y_1 := \frac{W \cdot x^2}{6E \cdot I}(3 \cdot L - x) = -0.548 \cdot in$

Case 2: Stress Pipe hang-off

$$D_w := \left(6 + \frac{5}{8}\right)\cdot in = 6.625\,in$$

$$y_2 := \left(\frac{1}{E}\right)\cdot \int_0^L \int_0^x \frac{(W\cdot x)}{\left[\frac{\pi}{64}\cdot\left[\left[\left(D_w - D\right)\cdot\frac{L - x}{L} + D\right]^4 - d^4\right]\right]}\,dx\,dx = -0.274\cdot in$$

$$y_3 := \left(\frac{1}{E}\right)\cdot \int_0^L \int_0^x \frac{(W\cdot x)}{(I)}\,dx\,dx = -0.274\cdot in$$

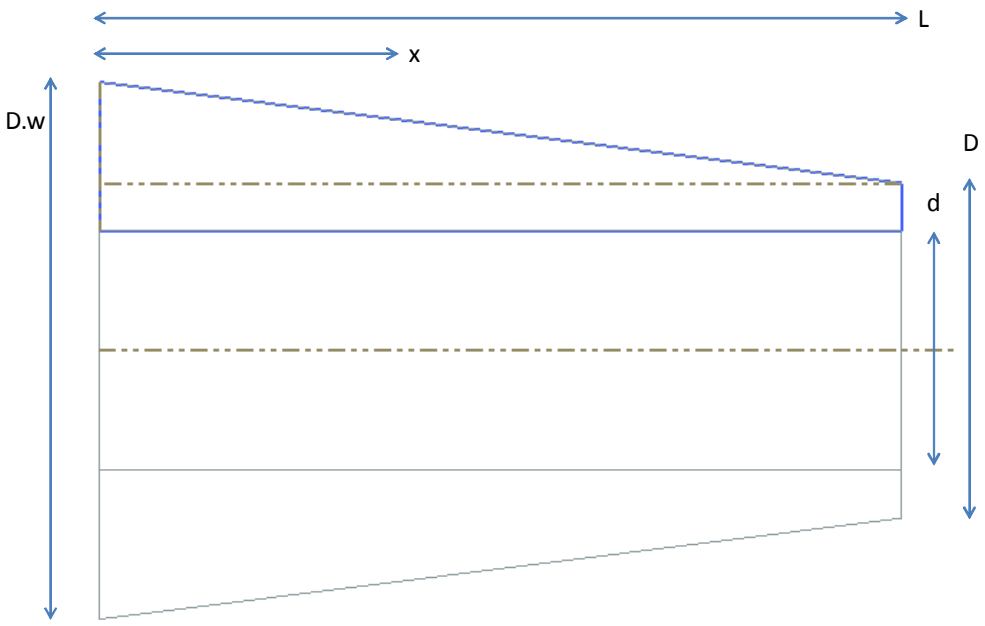
L

x

D.w

D

d


L
x
D.w
D
d