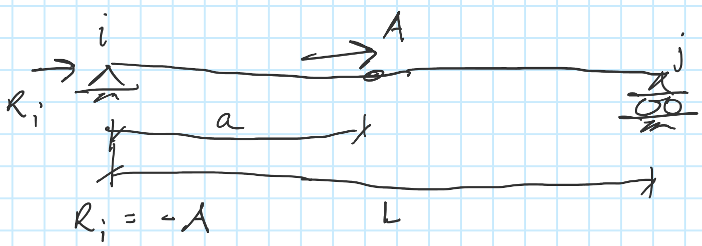
Axial load

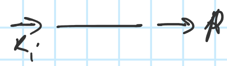
Tuesday, January 24, 2023 2:49 PM



$R_i = -A$

AXIAL LOAD

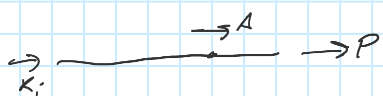
$0 \leq x \leq a$



$A + R_i = 0 \quad A = -R_i$

$P(x) = -R_i$

$a \leq x \leq L$



$R_i + A + P = 0$

$P = -R_i - A$

$P(x) = -R_i - A$

DEFORMATION

$0 \leq x \leq a$

$\bar{u}_x = \left[-R_i x + C_1 \right] \frac{1}{EA}$

$u_x = 0 \quad x = 0 \quad C_1 = 0$

$a \leq x \leq L$

$\bar{u}_x = \left[-R_i x - Ax + C_2 \right] \frac{1}{EA}$

$u_x = u_x \quad x = a$

$-R_1 a = -R_1 a - Aa + C_2$

$C_2 = Aa$

TEST

$u_{x_L} = \frac{1}{EA} \left[\int_0^a -R_i \, dx + \int_a^L -R_i - A \, dx \right]$

$= \left[-R_i L - AL + Aa \right] \frac{1}{EA}$

$u_{x_L} = -R_i L - AL + Aa$ ✓

Fixed End Force

$$0 = \left[-R_i L - AL + Aa\right]\frac{1}{EA}$$

$$R_i = \frac{-AL + Aa}{L} = \underline{\frac{A(a-L)}{L}}$$

$$R_j + R_i + A = 0$$

$$R_j = -R_i - A$$

$$R_j = \frac{AL - Aa}{L} - A = \underline{-\frac{Aa}{L}}$$