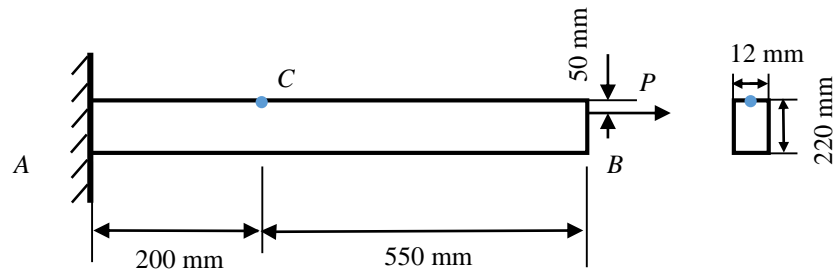


6-3. The right end of a cantilever is subject to a random force  $P \sim N(10,1^2)$  kN as shown in the figure. The cantilever has a thickness of 12 mm and  $P$  acts along the center line of the thickness. The weight of the cantilever is negligible. Determine the distribution of the tensile stress at point  $C$ .



**Solution:**

Section Properties

$$I = \frac{1}{12} (0.012)(0.22^3) = 1.06 \times 10^{-5} \text{ m}^4$$

Tensile Stress at point  $C$

$$S_C = \frac{P}{A} + \frac{Mc}{I} = \frac{P}{(0.012)(0.22)} + \frac{P(0.11 - 0.05)(0.11)}{1.0648 \times 10^{-5}} = (998.62) P$$

Since  $P \sim N(10,1^2)$  kN, we have

$$\mu_{S_C} = (998.62) \mu_P = 9.986 \text{ MPa}$$

$$\sigma_{S_C} = (998.62) \sigma_P = 0.999 \text{ MPa}$$

Thus, the tensile stress at point  $C$  follows a normal distribution of  $S_C \sim N(9.986, 0.9989^2)$  MPa .

**Ans.**