8-13. A 7-m long steel hollow circular tube has an outer diameter of $d_1 = 140$ mm and inner diameter of $d_2 = 120$ mm. The tube is pinned at both ends, and an axial force $P \sim N(180, 15^2)$ kN is acting on it. The modulus of elasticity follows $E \sim N(200, 20^2)$ GPa. Determine the distribution of the critical axial buckling load. Also, determine the probability of failure caused by buckling. Assume that E and P are independent and Euler's formula is available.

(**Ans.** $P_{cr} \sim N(349.61, 34.96^2)$ kN, $p_f = 4.1287 \times 10^{-6}$)

7 m