

53. A tension rod has a yield strength of $S_y \sim N(80, 8^2)$ MPa and a modulus of elasticity $E = 100$ GPa. If the length of rod is $l \sim N(2, 0.002^2)$ m and the maximum probability of failure is designed to be $p_f = 10^{-5}$, determine the allowable axial elongation using the First Order Second Moment Method.

Answer: $\delta_a = 0.92$ mm