

10. The weight of a grinding wheel is $m = 0.8$ kg. It has a diameter of $d_o = 250$ mm, a thickness of $t = 5$ mm, and a bore with a diameter of $d_i = 20$ mm. The material is isotropic, and the Poisson's ratio is $\nu = 0.20$. If the speed of the wheel is $n \sim N(2000, 20^2)$ rev/min, the allowable tangential stress is $S_a \sim N(3, 0.2^2)$ MPa, and n and S_a are independent, determine the probability of failure using the First Order Second Moment Method.

Answer: $p_f = 4.253(10^{-6})$