Homework 7

A cam system is shown in the figure, in which the cam rotates with a clockwise angular velocity of $\omega = 2$ rad/s at the instant $\theta = \dfrac{\pi}{3}$. The angular acceleration of the cam follows a normal distribution of $\alpha \sim N(4, 0.1^2)$ rad/s^2. The surface of the cam has a shape of a limacon defined by $r = (200 + 120\cos\theta)$ mm . Determine the distribution of a_r , which is the acceleration of the follower rod AB. If the allowable acceleration is $a = -1620$ mm/s^2 , the system fails when the magnitude of a_r is larger than that of a . Find the probability of failure of the system.

(**Ans.** $p_f = 1.0062 \times 10^{-5}$)