

Homework 6

A cam system is shown in the figure, in which the cam rotates with a clockwise angular velocity of $\omega = 4 \text{ rad/s}$ at the instant $\theta = \frac{\pi}{3}$. The angular acceleration of the cam follows a normal distribution of $\alpha \sim N(6, 0.3^2) \text{ rad/s}^2$. The surface of the cam has a shape of a limaçon defined by $r = (200 + 120 \cos \theta) \text{ mm}$. Determine the distribution of a_r , which is the acceleration of the follower rod AB . If the allowable acceleration is $a = -5170 \text{ mm/s}^2$, the system fails when the magnitude of a_r is larger than that of a . Find the probability of failure of the system.

(Ans. $p_f = 1.3151 \times 10^{-6}$)

