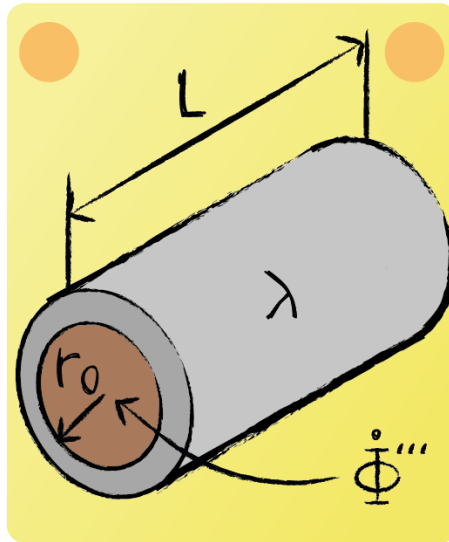


Lecture 13 Question 2

Heat is generated in a long wire of radius r_0 covered with a plastic insulation layer at a constant rate of $\dot{\Phi}'''$. Express the heat flux density \dot{q}'' at the interface using parameters π, r_0, L or $\dot{\Phi}'''$.



Heat flux passing the interface:

$$\dot{Q} = V \cdot \dot{\Phi}''' = \pi r_0^2 L \cdot \dot{\Phi}'''$$

Calculating the heat flux density:

$$\dot{q}'' = \frac{\dot{Q}}{A_s} = \frac{\pi r_0^2 L \cdot \dot{\Phi}'''}{2\pi r_0 L} = \frac{r_0 \cdot \dot{\Phi}'''}{2} = \frac{1}{2} r_0 \cdot \dot{\Phi}'''$$