

Question 1: Solution

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Q #1: Solution

CE 629A

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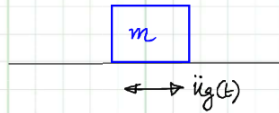
$$m = 1 \text{ kg}, \quad f = 5 \text{ Hz} \Rightarrow \omega = 2\pi f = 10\pi \text{ rad/sec}$$

$$u_g(t) = u_{g0} \sin \omega t$$

$$\dot{u}_g(t) = \omega u_{g0} \cos \omega t$$

$$\ddot{u}_g(t) = -\omega^2 u_{g0} \sin \omega t$$

$$= -\ddot{u}_{g0} \sin \omega t$$



$$\therefore P_{GA} = \ddot{u}_{g0} = \omega^2 u_{g0}$$

Equivalent force acting on the mass = $m \cdot P_{GA} = m \omega^2 u_{g0}$ (because the block is rigid)

The block starts to slip when this force exceeds the friction force F

$$\therefore m \omega^2 u_{g0} = F = \mu mg \quad \mu = \text{coefficient of friction}$$

$$\Rightarrow u_{g0} = \mu g / \omega^2 = \frac{(0.5)(9.81 \text{ m/s}^2)}{(10\pi \text{ rad/s})^2} = 4.96 \times 10^{-3} \text{ m} = 4.96 \text{ mm}$$

$$\therefore P_{GD} = u_{g0} = 4.96 \text{ mm}$$

