Question 1

24 February 2022   15:28

$$\frac{3}{10}$$

Budhaditya De
21103033

CE 629A – Earthquake Analysis and Design of Structures.   24/2/22

Midsem Exam:

Q:-1   Mass = 1kg.
frequency of sinusoidal excitation
= 5 Hz.

$\therefore T_n = \dfrac{1}{f} = 0.2$ sec.

$\omega_n = \dfrac{2\pi}{T_n} = 31.4$ rad/s.

$\mu = 0.5.$

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Equation of motion

$m\ddot{u} + ku + c\dot{u} \pm F = P(t).$

Sign of friction changes due to change in direction of motion —
+ve when $\dot{u} > 0$ and −ve when $\dot{u} < 0.$

thus, $m\ddot{u}(t) = -m\ddot{u}_g(t) \pm \mu mg$

$\ddot{u}(t) = -\ddot{u}_g(t) \pm \mu g.$

for very rigid system,

$\ddot{u}(t) = \ddot{u}_g(t).$ ✗

$2\ddot{u}_g(t) = \pm \mu g.$

$\ddot{u}_g(t) = \pm \dfrac{0.5 g}{2}$

$\Rightarrow \boxed{\ddot{u}_g(t) = \pm 0.25 g}$ ✗

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