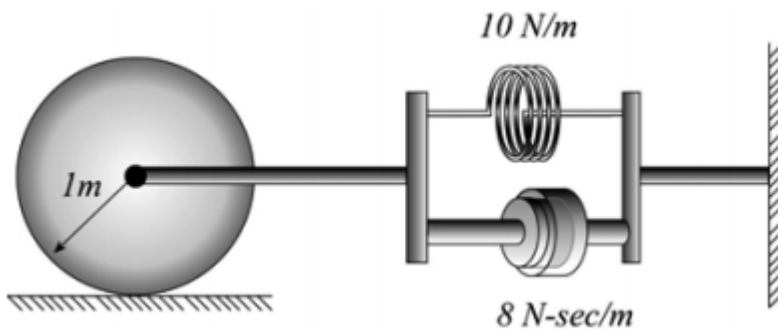


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A 12 kg spool that is 1 m in radius is pinned to a viscoelastic rod of negligible mass with effective properties $k = 10 \text{ N/m}$ and $c = 8 \text{ N-sec/m}$. The end of the rod is attached to a rigid support as shown. Determine the natural frequency of the system if the spool rolls without slipping.



Show transcribed image text

Expert Answer


venkataraju
 answered this

Given $m = 12 \text{ kg}$; $k = 10 \text{ N/m}$
 $c = 8 \text{ N-s/m}$

$$\zeta = \frac{c}{2\sqrt{km}} = \frac{8}{2\sqrt{10 \times 12}} = 0.365 < 1$$

$$\omega_d = \omega_n \sqrt{1 - \zeta^2}$$

$$\omega_n = \sqrt{\frac{k}{m}} = \sqrt{\frac{10}{12}} = 0.913$$

$$\omega_d = 0.913 \sqrt{1 - 0.365^2}$$

$\therefore \omega_d \approx 0.85 \text{ Hz}$

\therefore Natural frequency of system $\approx 0.85 \text{ Hz}$

0 Comments

Was this answer helpful?



Practice with similar questions

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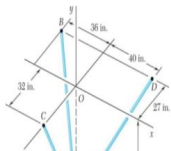
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A crate is supported by three cables as shown. Knowing that the tension in cable AD is 352 lb, de...

Question 4 5 points [See Answer](#)

A crate is supported by three cables as shown. Knowing that the tension in cable AD is 352 lb, determine the tension in cable AC. Round off only on the final answer expressed in 3 decimals and indicate unit.



[See answer](#)

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