

Fisika Dasar II

Pengayaan (Bagian 1)

S1 Teknik Sipil-Fakultas Teknik

Tim Dosen

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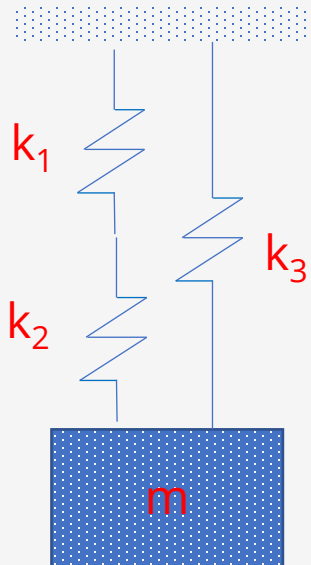
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Diketahui :

- Jika konstanta pegas $k_1 = k_2$ dan $k_3 = 2k_1$
- Frekuensi sistem $f = 5$ Hz
- Massa penggantung $m = 100$ gram

Ditanya:

- Konstanta pegas k_1 , k_2 , dan k_3
- Berapa pertambahan panjang akibat berat penggantung x



$$\frac{1}{k_{12}} = \frac{1}{k_1} + \frac{1}{k_2}$$

$$\frac{1}{k_{12}} = \frac{k_2 + k_1}{k_1 k_2}$$

$$k_{12} = \frac{k_1 k_2}{k_1 + k_2}$$

$$k_{tot} = k_{12} + k_3$$

$$k_{tot} = \frac{k_1 k_2}{k_1 + k_2} + k_3$$

$$k_1 = k_2; k_3 = 2k_1$$

$$k_{tot} = \frac{k_1 k_1}{k_1 + k_1} + 2k_1$$

$$k_{tot} = \frac{k_1 k_1}{2k_1} + 2k_1$$

$$k_{tot} = \frac{k_1}{2} + 2k_1$$

$$k_{tot} = \frac{5k_1}{2}$$

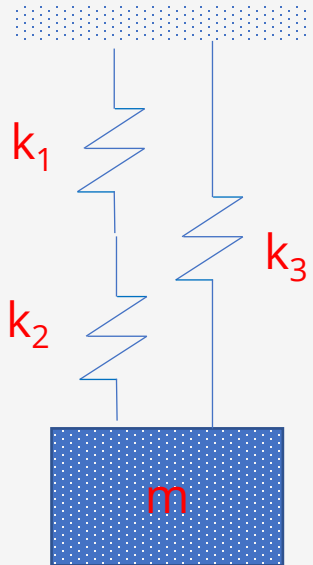


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$$f = \frac{1}{2\pi} \sqrt{\frac{k_{tot}}{m}}$$

$$2\pi f = \sqrt{\frac{k_{tot}}{m}}$$

$$(2\pi f)^2 = \frac{k_{tot}}{m}$$

$$k_{tot} = m(2\pi f)^2$$

$$\frac{5k_1}{2} = m(2\pi f)^2$$

$$k_1 = \frac{2}{5} m(2\pi f)^2$$

$$k_1 = \frac{2}{5} (0.1)(2 \times \pi \times 5)^2 = 39.478 \text{ N/m}$$

$$k_2 = 39.478 \text{ N/m}$$

$$k_3 = 78.956 \text{ N/m}$$

$$k_{tot} = \frac{5k_1}{2} = 98.695 \text{ N/m}$$

$$W = k_{tot} x$$

$$x = \frac{m \times g}{k_{tot}}$$

$$x = \frac{0.1 \times 10}{98.695} \times 1000 = 10.132 \text{ mm}$$



Terima kasih...

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