

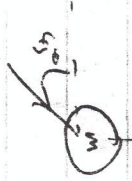
Laws. (10)

1976

$$\vec{v}_1 = a^2 + b^2$$

$$= a^2 + a^2$$

$$\vec{v}_2 = 2a$$



$$e = \frac{1}{2}$$

$$\vec{v}_1 = a^2 + b^2$$

$$\vec{v}_2 = 0$$

Remember:

$$\vec{v}_1 \perp \vec{v}_2 \Rightarrow$$

$$\vec{v}_1 = a^2 + b^2$$

System $T_{max} = \frac{R}{u}$

$$\Rightarrow a = b$$

$$\text{and: } \sqrt{a^2 + b^2} = u$$

$$\Rightarrow \sqrt{a^2 + a^2} = u$$

$$\Rightarrow \sqrt{2} a = u$$

$$\Rightarrow \sqrt{2} a = u$$

$$\Rightarrow \frac{u}{\sqrt{2}} = a$$

$$PCM: m(a) + R(0) = m(0) + R(x)$$

$$NLR: u_2 - v_1 = -a(u_2 - u_1)$$

$$x - 0 = -\frac{1}{2}(0 - a)$$

$$\Rightarrow x = \frac{1}{2}a$$

$$\Rightarrow x = \frac{1}{2} \left(\frac{u}{\sqrt{2}} \right) \Rightarrow x = \frac{u}{2\sqrt{2}}$$

(15)

PCM \Rightarrow

$$ma = \frac{m}{2}x$$

$$\frac{m}{\sqrt{2}} = \frac{m}{2\sqrt{2}}x$$

$$\Rightarrow m = \frac{1}{2}x$$

$$\Rightarrow \boxed{2m = x}$$

Loss in KE:

$$KE_{After} = \frac{1}{2}m(0)^2 + \frac{1}{2}R(x)^2 = \frac{1}{2} \cdot 2m \left(\frac{u}{2\sqrt{2}} \right)^2 = \frac{m u^2}{8}$$

$$KE_{Before} = \frac{1}{2}m a^2 + \frac{1}{2}R 0^2$$

$$= \frac{1}{2}m \left(\frac{u}{\sqrt{2}} \right)^2$$

$$= \frac{1}{2} \frac{m u^2}{2}$$

$$= \frac{m u^2}{4}$$

$$\Delta KE = \frac{m u^2}{8} - \frac{m u^2}{4} = -\frac{m u^2}{8}$$

Total Original KE = $\frac{1}{2}m(a^2 + b^2) + \frac{1}{2}R(0)^2$

$$= \frac{1}{2}m u^2$$

\therefore Fractional KE loss =

$$\frac{\frac{m u^2}{8}}{\frac{1}{2}m u^2} = \frac{1}{4} \quad (15)$$