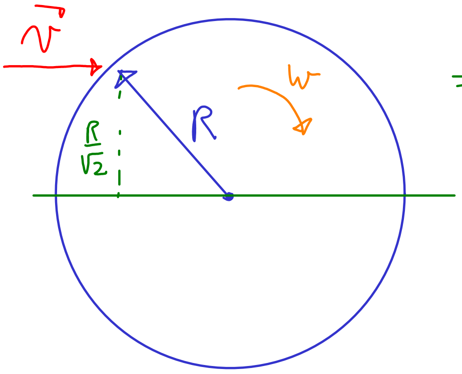
11.4

Zylinder: $I = \begin{pmatrix} \Theta, & & \\ & \Theta, & \\ & & \Theta \end{pmatrix}$ $\quad \Theta = \frac{1}{2} M R^2$

ALLE DREHIMPULSE SIND IN RICHTUNG INS BLATT HINEIN



$\Rightarrow \quad L_1 = m v \frac{R}{\sqrt{2}}$ VOR DEM STOß

$L_2 = \Theta \omega + R \cdot R \omega m$ nach dem Stoß

$= \omega (\Theta + R^2 m) = \omega R^2 \left(\frac{M}{2} + m \right)$

$L_1 = L_2 \Rightarrow \quad \omega = \frac{m v R}{\sqrt{2}} \frac{1}{R^2 \left(\frac{M}{2} + m \right)}$

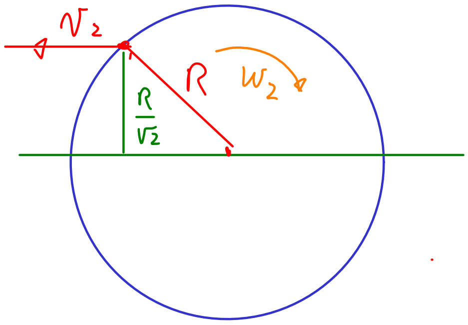
$E_1 = \frac{1}{2} m v^2$ vor

$E_2 = \frac{1}{2} \Theta \omega^2 + \frac{1}{2} m (\omega R)^2$ nach

$= R^2 \omega^2 \left(\frac{M}{4} + \frac{m}{2} \right)$

für $M = 2m \quad \omega = \frac{v}{R} \frac{1}{\sqrt{2}} \frac{1}{2}$

$\Rightarrow E_2 = m \frac{v^2}{8} = \frac{1}{4} E_1 \quad \Rightarrow \quad \frac{\Delta E}{E} = \frac{3}{4}$



$$L_1 = \frac{m v R}{\sqrt{2}}$$

v_2 ist positiv betrachtet

$$L_2 = \Theta \omega_2 - \frac{m v_2 R}{\sqrt{2}}$$

$$E_1 = \frac{1}{2} m v^2$$

$$E_2 = \frac{1}{2} \Theta \omega_2^2 + \frac{1}{2} m v_2^2$$

$$L_1 = L_2 \Rightarrow \omega_2 = \frac{m R}{\sqrt{2}} (v + v_2) \frac{1}{\Theta}$$

$$E_2 = \frac{1}{2} \Theta \underbrace{\frac{m^2 R^2}{2} \frac{1}{\Theta^2} (v + v_2)^2}_{\omega_2^2} + \frac{1}{2} m v_2^2 = E_1 = \frac{1}{2} m v^2$$

OPTIONAL ↓

$$\frac{1}{4} \frac{2}{M R^2} m^2 R^2 = \frac{1}{2} \frac{m^2}{M} \quad \overset{M = 2m}{\Rightarrow} \quad \frac{1}{4} m$$

$$= \frac{1}{4} m (v + v_2)^2 + \frac{1}{2} m v_2^2 = \frac{1}{2} m v^2$$

$$\frac{1}{2} (v + v_2)^2 + v_2^2 = v^2$$

$$\frac{3}{2} v_2^2 - \frac{1}{2} v^2 + 2 v v_2 = 0$$

$$v_2 = \frac{-v \pm \sqrt{v^2 + 3v^2}}{3} = \frac{v}{3}$$

($-v$ ist die Anfangssituation)