FLYWHEELS

(Toys)

- O: max stored energy $\quad U = \frac{1}{2} J \omega^2 \quad J = \frac{\pi}{2} \rho R^4 t$
- C: $R, t \rightarrow R^*, t^*$

  $\omega = \omega^*$ $\Rightarrow U_{max} = \frac{\pi}{4} \omega^{*2} R^{*4} t^* \rho \rightarrow \boxed{M_1 = \rho}$

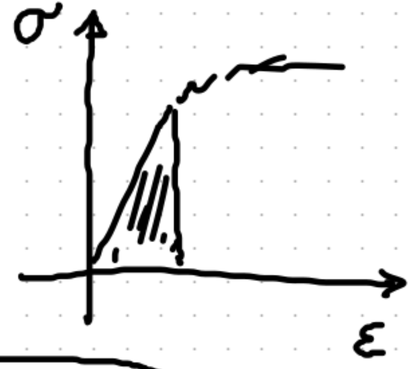
- ELECTRICAL EN. STORAGE
- O: max stored en. < per volume / per mass
- C: $R^*, t^* \quad \sigma_\omega < \sigma_f \quad \sigma_\omega = \frac{3+\nu}{8} \rho \omega^2 R^2 \Rightarrow \sigma_\omega \simeq \frac{1}{2} \rho \omega^2 R^2 \Rightarrow \omega^2 R^2 < \frac{\sigma_f \cdot 2}{\rho}$

  $\rightarrow U = \frac{\pi}{4} \omega^2 R^4 t \rho \Rightarrow \frac{U}{V} = \frac{\pi}{4} \frac{\omega^2 R^2 \rho}{\pi R^2} \Rightarrow \frac{U}{V} < \frac{1}{2} \sigma_f \quad \boxed{M_V = \sigma_f}$

- $\frac{U}{m} < \frac{1}{2} \frac{\sigma_f}{\rho} \Rightarrow \boxed{M_m = \frac{\sigma_f}{\rho}}$

SPRINGS | max elastic stored en.

O: max en. stored $U_v = \frac{\sigma^2}{2E} = \frac{1}{2}\varepsilon\sigma$



C. $\sigma < \sigma_f$ ⟵

$F < F_{cR}$ $\quad F_{cR} = \sigma_f A_{min}$ $\quad \sigma_f A_{min} > F$ $\quad \sigma_f > \frac{F}{A_{min}}$

$$\Rightarrow U_v < \frac{\sigma_f^2}{2E} \Rightarrow M = \frac{\sigma_f^2}{E}$$

$$\log M = 2\log\sigma_f - \log E$$