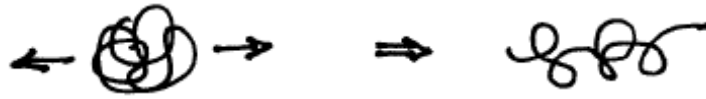
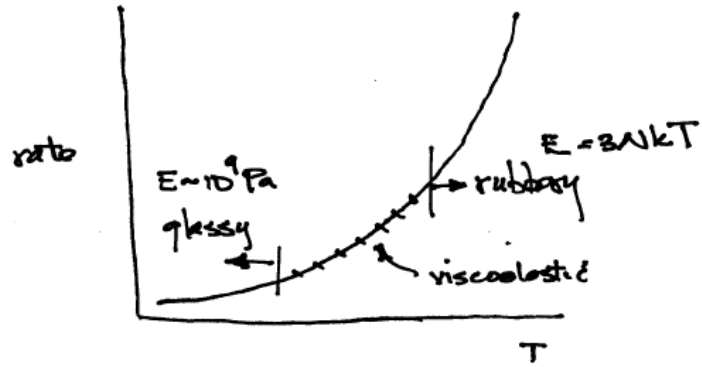


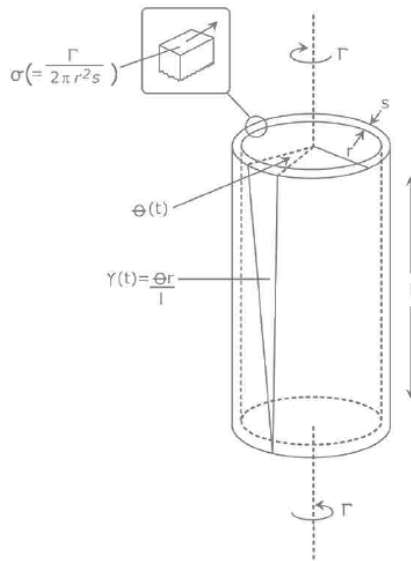
# 粘弹性



$$fdx = dU - TdS \quad (TdS \rightarrow \text{rate} \sim \exp(\frac{-E^*}{RT}))$$



## 简单剪切—薄壁圆筒的扭转

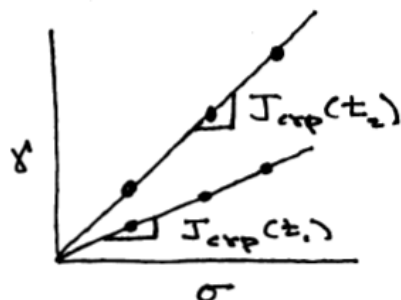
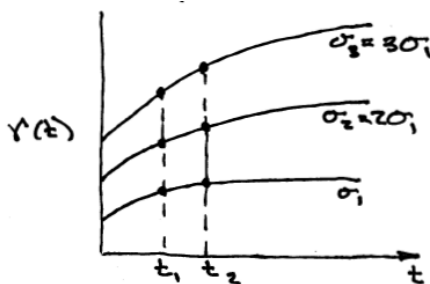


## 剪切柔量

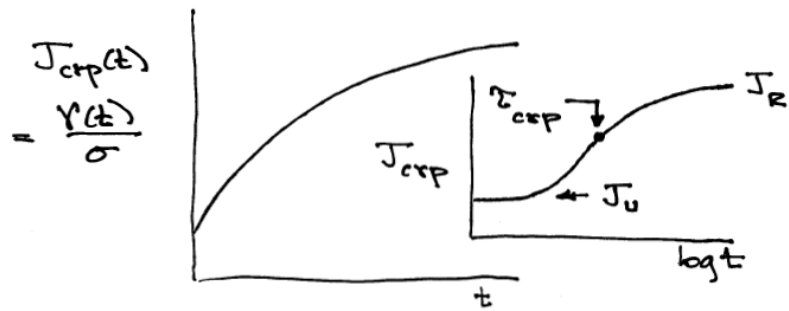
$$J = \frac{\gamma}{\sigma} = \frac{(\theta r / l)}{(\Gamma / 2\pi r^2 s)} = \left[ \frac{2\pi r^3 s}{l} \right] \frac{\theta}{\Gamma}$$

## 蠕变

$$\sigma = \text{const}, \gamma = \gamma(t)$$

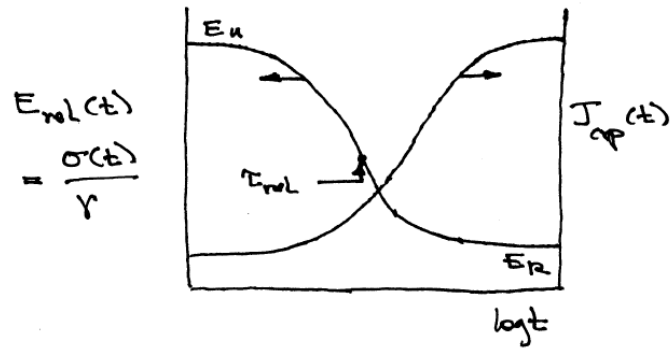


假如线性:  $\gamma(a\sigma) = a\gamma(\sigma)$



松驰

$\gamma = const, \sigma = \sigma(t)$



$$E_u = \frac{1}{J_u}, E_R = \frac{1}{J_R}$$

$$E_{wL}(t) \neq \frac{1}{J_{crp}}(t)$$

$$\tau_{crp} = \tau_{rel} \cdot \frac{E_u}{E_R}$$