

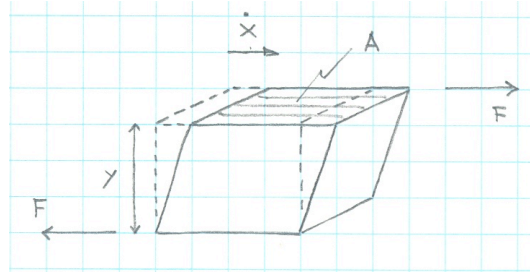
# Viscous and Elastic Responses [p1n21]

**Ideal viscous material: Newtonian fluid.**

- shear viscosity:  $\eta \doteq \frac{\sigma}{\dot{e}}, \quad \dot{e} \doteq \frac{\dot{x}}{y}, \quad \sigma \doteq \frac{F}{A}.$

▷  $\sigma$ : shear stress

▷  $\dot{e}$ : shear strain rate

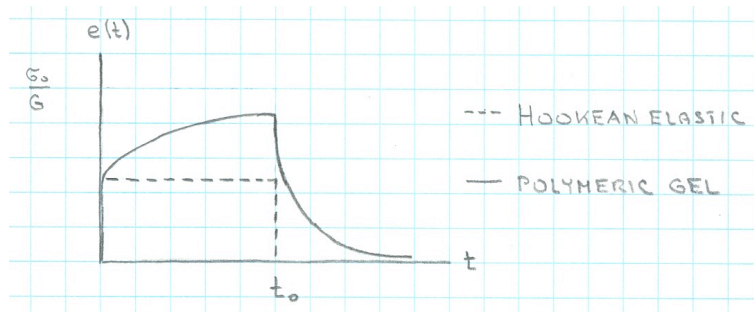


**Elasticity and viscosity with transients.**

Shear stress turned on at  $t = 0$  and turned off at  $t = t_0$ :

$$\sigma(t) = \sigma_0 \theta(t) \theta(t_0 - t).$$

Predominantly elastic response:



Predominantly viscous response:

