

1. **Prove** that a response of a generalized Bingham fluid

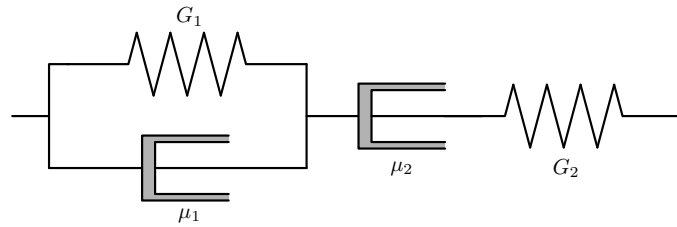
$$\begin{aligned} |\mathbf{S}| \leq \tau^* &\Leftrightarrow \mathbf{D} = \mathbf{O} \\ |\mathbf{S}| > \tau^* &\Leftrightarrow \mathbf{S} = \tau^* \frac{\mathbf{D}}{|\mathbf{D}|} + 2\mu(|\mathbf{D}|^2)\mathbf{D} \end{aligned}$$

is equivalent to the constitutive relation

$$2\mu(|\mathbf{D}|^2)\mathbf{D} = \frac{(|\mathbf{S}| - \tau^*)^+}{|\mathbf{S}|} \mathbf{S},$$

where $x^+ := \max\{0, x\}$, $\tau^* > 0$ and $\mu(\cdot) : \mathbb{R}_0^+ \rightarrow \mathbb{R}^+$.

2. Consider the Burgers element that is depicted in a Figure below:



Derive the stress-strain relation for this element.