1.) (c) A fluid that becomes less viscous as the strain increases, \( \mu = \tau / \dot{\gamma} \) and this ratio ↓

2.) Pathline: see page 157 in the text.


4.) \( \int_{s} e^{p} \cdot \hat{n} \cdot dA \) is the net flow of energy per unit time out of the CV through the CS. Can be negative if net flow of energy is in.

5.) Steady flow \( \Rightarrow \) (b) local acceleration is zero \( \frac{\partial \bar{V}}{\partial t} = 0 \)

6.) \[ \begin{array}{c}
\text{Assume: linear velocity profile in gap} \\
\text{Since } V_{0} = \text{const, } \sum F = 0 \\
F = W \Rightarrow \tau A = Mg \\
\mu \frac{V_{0}(\Pi DL)}{H} = Mg \\
V_{0} = \frac{MgH}{\Pi \mu DL}
\end{array} \]

7.) Max. height: \( \frac{V_{0}^2}{2} = g z_{\text{max}} \Rightarrow z_{\text{max}} = \frac{V_{0}^2}{2g} \)

\[ Q_{0} = V_{0} A_{0} \Rightarrow V_{0} = \frac{4Q_{0}}{\Pi D_{0}^2} \Rightarrow z_{\text{max}} = \frac{8Q_{0}^2}{\Pi^2 g D_{0}^4} \]

Also: \( \frac{V_{0}^2}{2} = \frac{V^2}{2} + g z \) for any \( z \)

\[ V = \sqrt{V_{0}^2 - 2gz} \text{ and } Q_{0} = V_{0} A_{0} = VA \Rightarrow D = \sqrt{\frac{4Q_{0}}{\Pi IV V_{0}^2 - 2g z}} \text{ ans. What happens at } z = z_{\text{max}}? \]