

P3) a) Fases viscosas preponderantes $\Rightarrow Re = Cte$.

$$Re = \frac{VD}{\gamma} = Cte \Rightarrow \lambda_{Re} = 1 ; \lambda_L = \frac{150}{15} = 10$$

$$\lambda_{Re} = \frac{\lambda_V \lambda_L}{\lambda_T} \Leftrightarrow 1 = \frac{\lambda_L \lambda_V}{\lambda_T} \quad \text{Como en el modelo th. se usa agua} \Rightarrow \lambda_V = 1$$

$$\Rightarrow 1 = \frac{10}{\lambda_T} \cdot \frac{10}{1} \Leftrightarrow \lambda_T = 100 \Rightarrow \lambda_V = \frac{\lambda_L}{\lambda_T} = \frac{10}{100} = 0,1$$

$$\lambda_M = \lambda_F \cdot \lambda_L ; \text{ Fases viscosas: } F = \frac{\mu \cdot \Delta V \cdot A}{\Delta y} ; \text{ pero } \lambda_\mu = 1 \Leftrightarrow \lambda_F = \lambda_V \cdot \lambda_L$$

$$\Rightarrow \lambda_M = \lambda_V \cdot \lambda_L^2 = 0,1 \cdot 10^2 = 10$$

$$\Rightarrow V_P = V_M \cdot \lambda_V = 25 [m/s] \cdot 0,1 = 2,5 [m/s]$$

$$M_P = M_M \cdot \lambda_M = 7,5 [Nm] \cdot 10 = 75 [Nm]$$

$$b) \frac{V_P}{V_M} = \frac{1,3 \cdot 10^{-6}}{13,9 \cdot 10^{-6}} = 0,09 ; \lambda_{Re} = \frac{\lambda_V \lambda_L}{\lambda_T} = 1 \Leftrightarrow \lambda_V = \frac{\lambda_L}{\lambda_T} = \frac{0,09}{110} = 0,0009$$

$$\lambda_\mu = \frac{S_P}{S_M} ; \lambda_S = \frac{S_P}{S_M} = \frac{1000}{1,18} = 847 \Rightarrow \lambda_\mu = 847 \cdot 0,0009 = 76,23$$

$$\lambda_M = \lambda_F \cdot \lambda_L ; \lambda_F = \lambda_\mu \cdot \lambda_V \cdot \lambda_L \Rightarrow \lambda_M = \lambda_\mu \cdot \lambda_V \cdot \lambda_L^2 = 76,23 \cdot 0,0009 \cdot 10^2 = 68,6$$

$$\Rightarrow V_M = \frac{V_P}{\lambda_V} = \frac{2,5}{0,0009} = 278 [m/s]$$

$$M_M = \frac{M_P}{\lambda_M} = \frac{75}{68,6} = 1,09 [Nm]$$