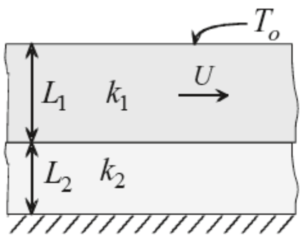
1- A plate of thickness L_1 and conductivity k_1 moves with a velocity U over a stationary plate of thickness L_2 and conductivity k_2. The pressure between the two plates is P and the coefficient of friction is μ. The surface of the stationary plate is insulated while that of the moving plate is maintained at constant temperature T_o. Determine the steady state temperature distribution in the two plates.



2- A circumferential fins of rectangular cross section area of thickness t and length L with thermal conductivity coefficient of k is installed on a pipe with outside radius of r_1 as shown in figure 1.

The fin is subjected to an environment of temperature T_∞ and convention heat transfer coefficient of h. Obtain:

1. Fin temperature distribution
2. Rate of heat transfer
3. Fin efficiency
4. plot η verses $L_c^{3/2}(\frac{h}{kA_m})^{1/2}$ for $\frac{r_{2c}}{r_1} \in \{1,2,3,4,5\}$ in a figure, where variables are :

$L_c = L + t/2; \quad r_{2c} = r_1 + L_c; \quad A_m = t(r_{2c} - r_1)$

5. compare the plot with results of Gardner that is plotted in figure 2-12 in text book of **Heat Transfer , J.P.Holman.**

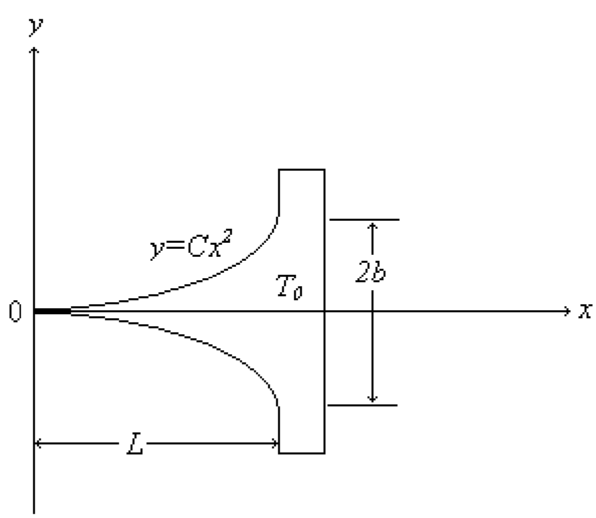


Fig.2

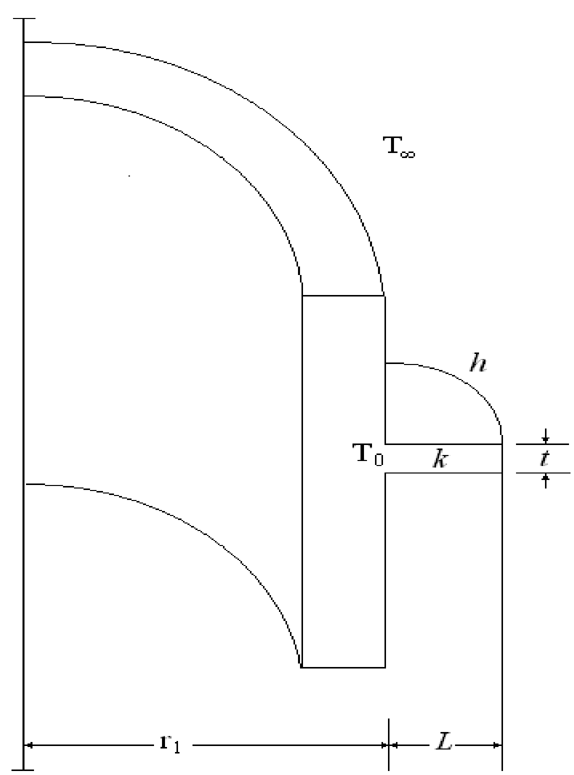


Fig.1

3- A straight fin of a parabolic profile of $y=Cx^2$ (C is constant), is subjected to an environment of temperature T_∞. As shown in figure 2, the fin length is L and its bases thickness is $2b$. The fin thermal conductivity is k, the heat transfer coefficient between the fin and the environment is h and the fin base temperature is T_0.

(a) Find steady state temperature distribution of the fin.

(b) Calculate total heat transfer from the fin.