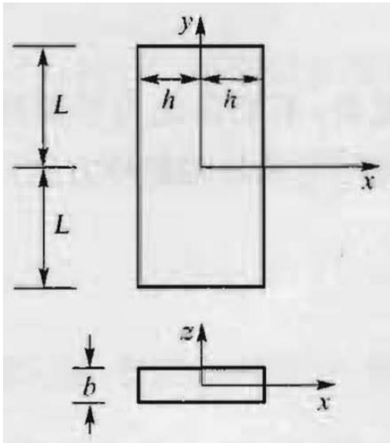
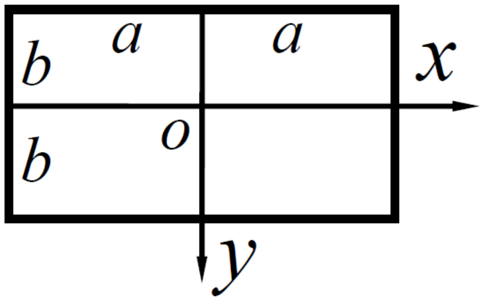
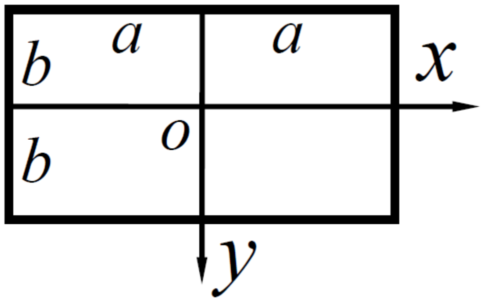
1. The thin-plate shown below ($b \ll h \ll L$) is heated non-uniformly from zero to a temperature distribution $T = T(x)$. In the plane stress state, one may assume that $\sigma_x = \tau_{xy} = 0$, $\sigma_y = \sigma_y(x)$. Determine (a) the assumed plane stress state satisfies the equilibrium condition in the absence of body forces; (b) the most general form of σ_y from the stress compatibility condition; (c) the integral constants in σ_y from the statically equivalent boundary conditions at $y = \pm L$.



2. Determine the thermoelastic stress in the rectangular thin-plate shown below ($b \ll a$). The temperature variation is given by $T = T_0 \cos \frac{\pi y}{2b}$.



3. Determine the thermoelastic stress in the rectangular thin-plate shown below. The temperature variation is given by $T = T_0 + T_1 x/a + T_2 y/b$, where T_0, T_1, T_2 are constants.



4. Consider the axisymmetric plane strain problem of a solid circular bar of radius *a* with a constant internal heat generation specified by h_o. The steady state conduction equation thus becomes

$$\frac{\partial^2 T}{\partial r^2} + \frac{1}{r}\frac{\partial T}{\partial r} + h_0 = 0$$

Using boundary condition $T(a) = T_o$, determine the temperature distribution, and then calculate the resulting thermal stresses for the case with zero boundary stress. Such solutions are useful to determine the thermal stresses in rods made of radioactive materials.