

Homework #4

1. (10 pts) Steady heat conduction occurs in a 2-D domain having width and height L and H , respectively, according to the Laplace equation

$$\nabla^2 T = 0 \quad \text{where} \quad T = T(x, y),$$

and where the boundary conditions are given by

$$T(0, y) = T(x, 0) = 0, \quad T(x, H) = T_0, \quad \left. \frac{\partial T}{\partial x} \right|_{x=L} = 0,$$

where T_0 is a constant, as shown in Fig. 1. Determine the exact solution for $T(x, y)$ using the separation of variables method.

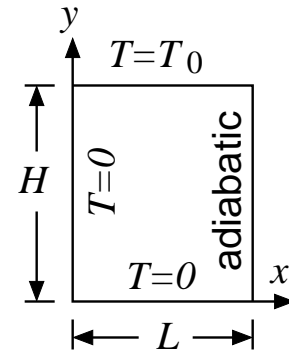


Figure 1: 2-D Conduction.