

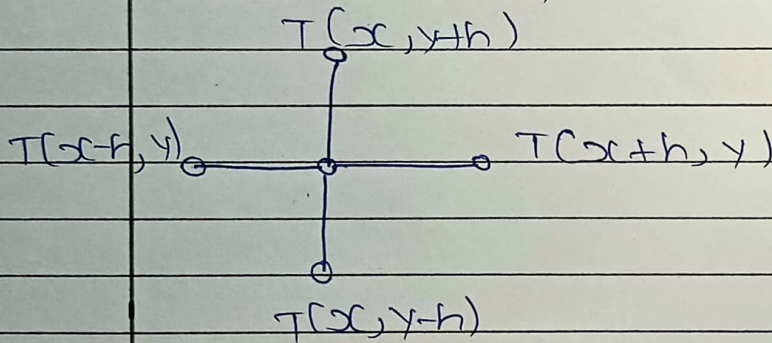
Assignment: 3

* 2D conduction Heat Transfer (steady)

$$\frac{\partial T}{\partial t} = \frac{\partial}{\partial x} \left(\alpha \frac{\partial T}{\partial x} \right) + \frac{\partial}{\partial y} \left(\alpha \frac{\partial T}{\partial y} \right)$$

$$\frac{\partial T}{\partial t} \approx \frac{\Delta T}{\Delta t} \Rightarrow \frac{T(x, y) - T(x, y)}{\Delta T}$$

$$\alpha \frac{\partial^2 T}{\partial x^2} + \alpha \frac{\partial^2 T}{\partial y^2}$$



$$T(x+h) = T(x) + h \frac{\partial T}{\partial x} + \frac{h^2}{2} \frac{\partial^2 T}{\partial x^2}$$

$$T(x-h) = T(x) - h \frac{\partial T}{\partial x} + \frac{h^2}{2} \frac{\partial^2 T}{\partial x^2}$$

$$T(y+h) = T(y) + h \frac{\partial T}{\partial y} + \frac{h^2}{2} \frac{\partial^2 T}{\partial y^2}$$

$$T(y-h) = T(y) - h \frac{\partial T}{\partial y} + \frac{h^2}{2} \frac{\partial^2 T}{\partial y^2}$$

$$4T(x, y) + \frac{h^2 \partial^2 T}{\partial x^2} + \frac{h^2 \partial^2 T}{\partial y^2}$$

$$\frac{\partial^2 T}{\partial x^2} + \frac{\partial^2 T}{\partial y^2} = \frac{1}{h^2} \left(T(x+h, y) + T(x-h, y) + T(x, y+h) + T(x, y-h) - 4T(x, y) \right)$$

$$T(x, y) = T(x, y) + \frac{\Delta t^2}{h^2} \left[T(x+h, y) + T(x-h, y) + T(x, y+h) + T(x, y-h) - 4T(x, y) \right]$$