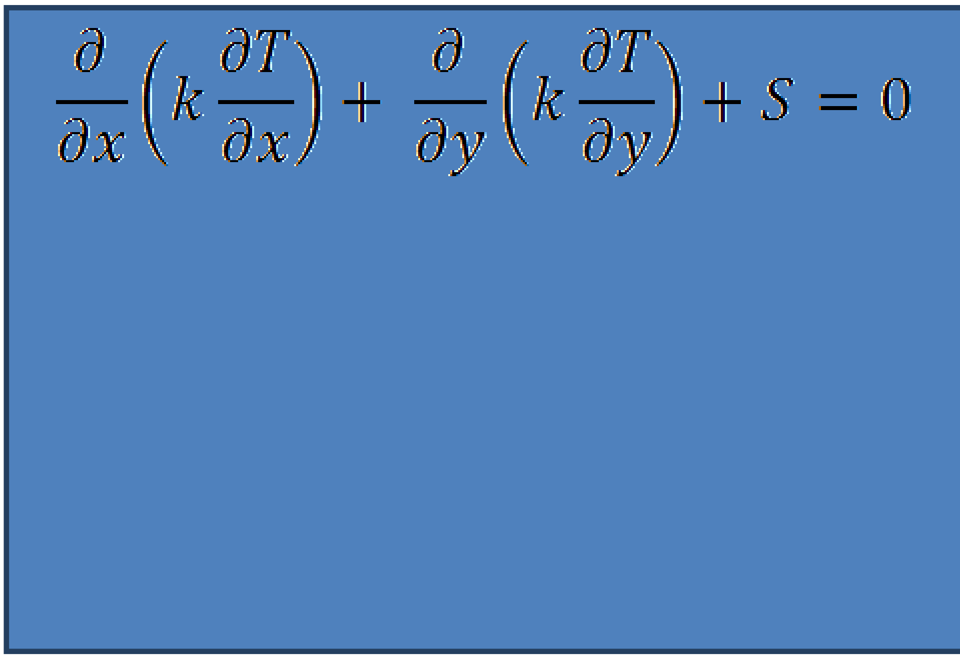
The Governing equation, computational Domain and Boundary conditions:

The computational Domain is a rectangle with L length and H Height.

Bounadry3

y=H



$$\frac{\partial}{\partial x}\left(k\frac{\partial T}{\partial x}\right)+\frac{\partial}{\partial y}\left(k\frac{\partial T}{\partial y}\right)+S=0$$

Boundary 4

oundary2

y=0

Boundary 1

x=0

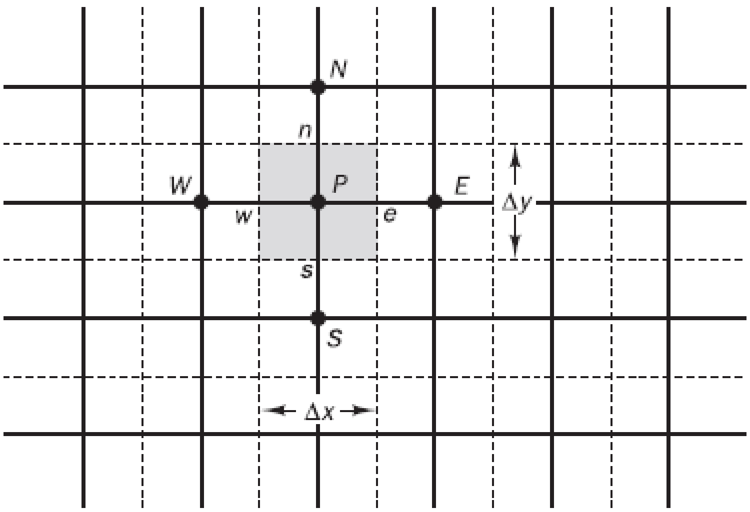
x=L

The Boundary conations are (case11):

Boundary1	Boundary2	Boundary3	Boundary4	Length	Height	S	k
10	$\frac{\partial T}{\partial n}=0$	15	60	2.5	2	40	0.5

Discretization:

The governing equation is $\frac{\partial}{\partial x}\left(k\frac{\partial T}{\partial x}\right) + \frac{\partial}{\partial y}\left(k\frac{\partial T}{\partial y}\right) + S = 0$, a portion of discretized grid is shown below:



Integrating over the control volume we obtain

$$\int_{\Delta V} \frac{\partial}{\partial x}\left(k\frac{\partial T}{\partial x}\right) dx.dy + \int_{\Delta V} \frac{\partial}{\partial y}\left(k\frac{\partial T}{\partial y}\right) dx.dy \; + \int_{\Delta V} S_{\emptyset}\, dV = 0$$

$$k.A_e\left[\frac{dT}{dx}\right]_e - k.A_w\left[\frac{dT}{dx}\right]_w + k.A_n\left[\frac{dT}{dy}\right]_n - k.A_s\left[\frac{dT}{dy}\right]_s + \bar{S}\,\Delta V = 0$$

$$A_e = A_w = \Delta y\,, A_n = A_s = \Delta x$$

$$k.A_e\left[\frac{T_e - T_p}{\Delta x}\right]_e - k.A_w\left[\frac{T_p - T_w}{\Delta x}\right]_w + k.A_n\left[\frac{T_n - T_p}{\Delta y}\right]_n - k.A_s\left[\frac{T_p - T_s}{\Delta y}\right]_s + \bar{S}\,\Delta V = 0$$

$$\bar{S}\,\Delta V = S_u + S_p T_p$$

$$\left[\frac{k.A_e}{\Delta x}+\frac{k.A_s}{\Delta x}+\frac{k.A_s}{\Delta y}+\frac{k.A_n}{\Delta y}-S_p\right]T_p$$
$$=\left[\frac{k.A_e}{\Delta x}\right]T_e+\left[\frac{k.A_w}{\Delta x}\right]T_w+\left[\frac{k.A_n}{\Delta y}\right]T_n+\left[\frac{k.A_s}{\Delta y}\right]T_s+S_u$$

$$a_pT_p = a_eT_e + a_sT_s + a_nT_n + a_sT_s + S_u$$

At the Boundaries the discretized equation should be modified to incorporate the specified boundary conditions.