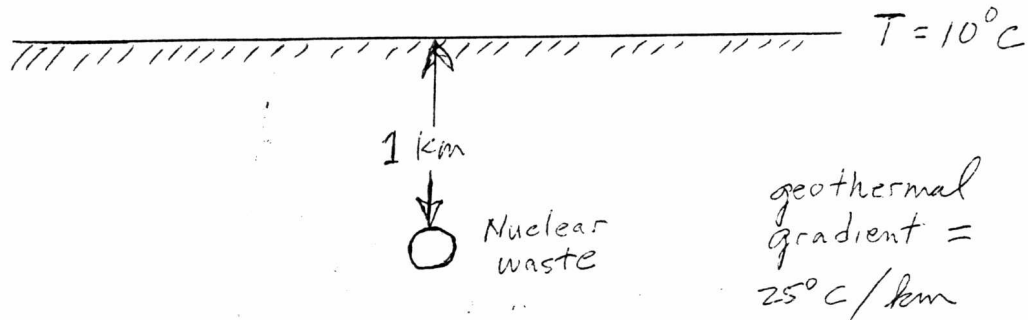


GEO 5500 Numerical Methods in the Geosciences
Computer Assignment #10
2-Dimensional Finite Difference Methods

Assigned: April 14, 2005
 Due: April 21, 2005

The steady state temperature field for a nuclear waste canister buried at depth can be represented by the diagram shown below:



The governing equation for this situation is:

$$\frac{\partial^2 T}{\partial x^2} + \frac{\partial^2 T}{\partial y^2} + \frac{A}{k} = 0$$

for the x, y point of canister, where $A = 50 \text{ Wm}^{-3}$ and $k = 10 \text{ Wm}^{-1} \text{ } ^\circ\text{C}^{-1}$

For all other parts of the domain, the governing equation is simply:

$$\frac{\partial^2 T}{\partial x^2} + \frac{\partial^2 T}{\partial y^2} = 0$$

(a). Write out the 2-dimensional finite difference formulation of the governing equation, and the appropriate boundary conditions assuming that the radioactive canister is placed in the central part of the domain.

(b). Write a computer code of your finite difference formulation that solves the temperature field for this problem.