ESO 208A; ESO 218

Computational methods in engineering

Tutorial # 11

November 7, 2013

1. Solve the following PDE for heat conduction

$$\frac{\partial T}{\partial t} - \alpha \frac{\partial^2 T}{\partial x^2} = 0$$

subjected to the

Initial conditions: T (x,0)= 0.0 for all x

Boundary conditions: T(0,t) = 60; T(1,t) = 20 for all t.

Other data: length of the rod = 10; there are 5 nodes including the end nodes; and α = 0.5

a. Determine the category of the PDE.
b. Use an explicit formulation to find out the temperature at the interior nodes at time, t=15 s.
c. Use the above scheme to find the steady state solution.
d. Formulate the solution in implicit finite difference.