

1) A heated rod with a uniform heat source can be modeled with the following equation

$$\frac{d^2T}{dx^2} = -f(x)$$

Given a heat source $f(x) = 25$

Boundary conditions : $T(x=0) = 40$ and $T(x=10) = 200$

Solve for Temperature distribution with

a) Shooting Method

b) Finite-difference method

c) Any method, now the boundary condition at left end is $T'(0) = 0$

2) Solve using Explicit Schmidt Method

$$\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2}$$

$$\text{I.C. } u(x, 0) = \sin \pi x$$

$$\text{B.C. : } u(0, t) = 0 \quad u(1, t) = 0$$

Use $h=1/3$ and $k = 1/36$

3) Ends of rod are kept in contact at $T=0$ and the initial temperature distribution

$$u = 2x, 0 \leq x \leq 0.5$$

$$u = 2(1 - x), 0.5 \leq x \leq 1$$

Solve

$$\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2}$$

Schmidt Method

a) $h=0.1$, $k = 0.001$

b) $h=0.1$, $k = 0.01$

Submit your code, output as

MA1NNNN- _Name- _13Feb2020.zip or .tar

Make subdirectories for each problem

Pb1

Pb2

Pb3