Advanced Mathematical techniques in Chemical Engineering

Module XII : Solution of PDEs by Similarity solution method

Exercises

1. Solve the equation $\dfrac{\partial u}{\partial t} = \dfrac{\partial^2 u}{\partial x^2}$ subject to following conditions. At t=0, u=0; at x=0 u=2x and

at y=∞, u=0

2. Solve the equation $y\dfrac{\partial u}{\partial x} = \dfrac{\partial^2 u}{\partial y^2}$ subject to following conditions. At x=0, u=1; at y=0 u=u_0

and at y=∞, u=0.

3. Solve the above problem with the boundary condition at y=∞, u=2

4. Solve the above problem with the boundary condition at y=∞, $\dfrac{\partial u}{\partial y} + u = 0$

5. Solve the equation $\dfrac{\partial u}{\partial t} = \dfrac{\partial^2 u}{\partial x^2}$ subject to following conditions. At t=0, u=0; at x=0 u=1 and

at y=∞, $\dfrac{\partial u}{\partial y} = 0$