

با یاد او

سری ششم تمرینات ریاضی مهندسی

مسائل زیر را با استفاده از تبدیلات فوریه متناهی حل کنید.

$$1. \quad u_{tt} = 4u_{xx} + 3e^{t+x}, \quad 0 \leq x \leq \pi, t \geq 0 \\ u(x, 0) = e^x, \quad u_t(x, 0) = 0, \quad u_x(0, t) = t, \quad u_x(\pi, t) = 1$$

$$2. \quad u_{xx} + u_{yy} + u_{zz} = xyz, \quad 0 \leq x, y, z \leq 1 \\ u(0, y, z) = yz, \quad u_x(1, y, z) = 0, \\ u_y(x, 0, z) = xz, \quad u(x, 1, z) = 0, \\ u(x, y, 0) = xy, \quad u(x, y, 1) = 0$$

$$3. \quad u_t = u_{xx} + u_{xxt} - u_{xxyy} + xyt, \quad 0 \leq x, y \leq 1, t \geq 0 \\ u(x, y, 0) = xy^2, \\ u|_{x=0} = yt, \quad u|_{x=1} = 0, \quad u_y|_{y=0} = xt, \quad u_y|_{y=1} = 0$$

$$4. \quad u_{tt} = u_{xx} + u_{ttxx} - u + t\delta(x - \frac{\pi}{4}), \quad 0 < x < \pi, t > 0 \\ u(x, 0) = x, \quad u_t(x, 0) = 1, \quad u(0, t) = t, \quad u_x(\pi, t) = 1.$$

$$5. \quad u_t = u_{xx} + u_{yy} - u_{xxyy} - 2u + xyt, \quad 0 < x, y < \pi, t > 0 \\ u(x, y, 0) = y\delta(x - \frac{\pi}{4}), \quad u_t(x, y, 0) = x\delta(x - \frac{\pi}{4}), \\ u_x(0, y, t) = y\delta(t - 1), \quad u(\pi, y, t) = yt, \\ u_y(x, 0, t) = t\delta(x - \frac{\pi}{4}), \quad u(x, \pi, t) = t^2\delta(x - \frac{\pi}{4}).$$