

Cooling of a cube with convective boundary condition

This text is integrating part of the homonymous link in [PEEI: a computer program for the numerical solution of differential analytical models \(i.e. systems of partial differential equations\)](#).

Coordinate system: Cartesian

System of measurement: International System of Units

Coordinates of Cartesian system: \underline{x} of which $\underline{x}=\{x_n;n=1,4\}=\{x,y,z,t\}$ $\underline{x}_v=\{x,y,z\}$
 $\{[x_n]=[length];n=1,3\}$ $[t]=[time]$ $\{\mathbb{R}\langle x_n\rangle=(-\infty,\infty);n=1,4\}$

Unknown functions: $\tau(\underline{x})$ of which $[\tau]=[temperature]$

Differential analytic model: $\psi \cdot \partial \tau(\underline{x}) / \partial t - \partial^2 \tau(\underline{x}) / \partial x^2 - \partial^2 \tau(\underline{x}) / \partial y^2 - \partial^2 \tau(\underline{x}) / \partial z^2 = 0$ of which
 $\psi = \rho \cdot c_s / K$ $\rho = 7933$ $c_s = 460$ $K = 20$

Definition set: $\{\underline{x} / 0 \leq x_n \leq \mathbb{N}_n; n=1,4\}$ $\{\mathbb{N}_n=1; n=1,3\}$ $\mathbb{N}_4 = 3600 \cdot 20$

Conditions: $\{\tau(\underline{x}_v, 0) = 1; \forall \{0 \leq x_n \leq \mathbb{N}_n; n=1,3\}\}$ $K \cdot (\partial \tau(0, y, z, t) / \partial x) - H \cdot (\tau(0, y, z, t) - \tau_\infty) =$
 $K \cdot (\partial \tau(1, y, z, t) / \partial x) + H \cdot (\tau(1, y, z, t) - \tau_\infty) = K \cdot (\partial \tau(x, 0, z, t) / \partial y) - H \cdot (\tau(x, 0, z, t) - \tau_\infty) =$
 $K \cdot (\partial \tau(x, 1, z, t) / \partial y) + H \cdot (\tau(x, 1, z, t) - \tau_\infty) = K \cdot (\partial \tau(x, y, 0, t) / \partial z) - H \cdot (\tau(x, y, 0, t) - \tau_\infty) =$
 $K \cdot (\partial \tau(x, y, 1, t) / \partial z) + H \cdot (\tau(x, y, 1, t) - \tau_\infty) = 0$ $H = 50$ $\tau_\infty = 0$

Related files: [mad.txt](#)

Case 1-1:

Related files: [points-1-1.txt](#), [PEEI-mem-1-1.bin](#), [cond-1-1.txt](#), [PEEI-sol-1-1.txt](#), [plot-1-1.jpg](#)

Case 1-2:

Related files: [points-1-2.txt](#), [PEEI-mem-1-2.bin](#), [cond-1-2.txt](#), [PEEI-sol-1-2.txt](#), [plot-1-2.jpg](#)

Case 1-3:

Related files: [points-1-3.txt](#), [PEEI-mem-1-3.bin](#), [cond-1-3.txt](#), [PEEI-sol-1-3.txt](#), [plot-1-3.jpg](#)

Case 1-4:

Related files: [points-1-4.txt](#), [PEEI-mem-1-4.bin](#), [cond-1-4.txt](#), [PEEI-sol-1-4.txt](#), [plot-1-4.jpg](#)

Case 2-1:

Related files: [points-2-1.txt](#), [PEEI-mem-2-1.bin](#), [cond-2-1.txt](#), [PEEI-sol-2-1.txt](#), [plot-2-1.jpg](#)

Case 2-2:

Related files: [points-2-2.txt](#), [PEEI-mem-2-2.bin](#), [cond-2-2.txt](#), [PEEI-sol-2-2.txt](#), [plot-2-2.jpg](#)

Case 2-3:

Related files: [points-2-3.txt](#), PEEI-mem-2-3.bin, [cond-2-3.txt](#), [PEEI-sol-2-3.txt](#), [plot-2-3.jpg](#)

Case 2-4:

Related files: [points-2-4.txt](#), PEEI-mem-2-4.bin, [cond-2-4.txt](#), [PEEI-sol-2-4.txt](#), [plot-2-4.jpg](#)

Case 3-1:

Related files: [points-3-1.txt](#), PEEI-mem-3-1.bin, [cond-3-1.txt](#), [PEEI-sol-3-1.txt](#), [plot-3-1.jpg](#)

Case 3-2:

Related files: [points-3-2.txt](#), PEEI-mem-3-2.bin, [cond-3-2.txt](#), [PEEI-sol-3-2.txt](#), [plot-3-2.jpg](#)

Case 3-3:

Related files: [points-3-3.txt](#), PEEI-mem-3-3.bin, [cond-3-3.txt](#), [PEEI-sol-3-3.txt](#), [plot-3-3.jpg](#)

Case 3-4:

Related files: [points-3-4.txt](#), PEEI-mem-3-4.bin, [cond-3-4.txt](#), [PEEI-sol-3-4.txt](#), [plot-3-4.jpg](#)