Cooling of a Cube with Convective Boundary Condition

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http://www.giacomo.lorenzoni.name/PEEI_4.0.0.1/Cooling_of_a_cube_with_convective_boundary_condition/

http://www.giacomo.lorenzoni.name/PEEI_4.0.0.1/PEEIapplDown.aspx?var=5

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 systems of partial differential equations.

Coordinate system: Cartesian

System of measurement: International System of Units

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

Unknown functions: $T(\underline{x})$ of which $[T]\equiv[\text{temperature}]$

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

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

Conditions: $\{T(\underline{x}_v,0)=1;\forall\{0\le x_n\le\bar{\bar{x}}_n;n=1,3\}\}$ $\kappa\cdot(\partial T(0,y,z,t)/\partial x)-H\cdot(T(0,y,z,t)-T_\infty)=\kappa\cdot(\partial T(1,y,z,t)/\partial x)+H\cdot(T(1,y,z,t)-T_\infty)=\kappa\cdot(\partial T(x,0,z,t)/\partial y)-H\cdot(T(x,0,z,t)-T_\infty)=\kappa\cdot(\partial T(x,1,z,t)/\partial y)+H\cdot(T(x,1,z,t)-T_\infty)=\kappa\cdot(\partial T(x,y,0,t)/\partial z)-H\cdot(T(x,y,0,t)-T_\infty)=\kappa\cdot(\partial T(x,y,1,t)/\partial z)+H\cdot(T(x,y,1,t)-T_\infty)=0$ $H=50$ $T_\infty=0$

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