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APPROXIMATE SOLUTION FOR 3D SYSTEM WITH FIN

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In some our previous papers (e.g. [1]) we gave approximate solution of 2D problem. We consider here a 3D periodical system: the wall $\{x \in [0,\delta], y \in [0,1], z \in [0,Z]\}$ with the fin$\{x \in [\delta,\delta+l], y \in [0,b], z \in [0,Z]\}$. The heat transfer is described by Laplace's equations with boundary conditions (here $U_0(x,y,z)$ $(U(x,y,z))$ is a temperature of the wall (fin)):

$$\frac{\partial U_0}{\partial x} + \beta_0^0(1-U_0) = 0, \quad x = 0,$$

$$\frac{\partial U_0}{\partial x} + \beta_0 U_0 = 0, \quad x = \delta, \quad y \in (b,1),$$

$$\frac{\partial U}{\partial x} + \beta U = 0, \quad x = \delta + l, \quad y \in (0,b),$$

$$\frac{\partial U}{\partial y} + \beta U = 0, \quad x \in (\delta,\delta+l), \quad y = b,$$

$$\frac{\partial U_0}{\partial z} + \beta_0 U_0 = 0, \quad z = Z, \quad y \in (b,1),$$

$$\frac{\partial U}{\partial z} + \beta U = 0, \quad z = Z, \quad x \in (\delta,\delta+l),$$

$$\frac{\partial U_0}{\partial y}\Big|_{y=0} = \frac{\partial U_0}{\partial y}\Big|_{y=1} = \frac{\partial U_0}{\partial z}\Big|_{z=0} = 0, \quad x \in (0,\delta),$$

$$\frac{\partial U}{\partial y}\Big|_{y=0} = \frac{\partial U}{\partial z}\Big|_{z=0} = 0, \quad x \in (\delta,\delta+l),$$

$$U_0\big|_{x=\delta-0} = U\big|_{x=\delta+0}, \quad y \in (0,b), \quad z \in (0,Z),$$

$$\beta\frac{\partial U_0}{\partial x}\Big|_{x=\delta-0} = \beta_0\frac{\partial U}{\partial x}\Big|_{x=\delta+0}, \quad y \in (0,b), \quad y \in (0,Z).$$

This new solutions we compare with well known exact solution of one-dimensional problem and with the 2D solution from [1].

REFERENCES

[1] A. Buikis and M. Buike. Closed two-dimensional solution for heat transfer in a periodical system with a fin. *Proc. Latv. Acad. Sci. Sect. B*, **52** (5), 1998, 218 - 222.