An application of generalized finite differences to unsteady heat problems subject to mixed boundary conditions

Francisco Domínguez-Mota*, Fernando Guillén, J. Gerardo Tinoco-Ruiz, Gerardo Tinoco-Guerrero, Alejandra Valencia

* Facultad de Ciencias Físico Matemáticas
Universidad Michoacana de San Nicolás de Hidalgo
Edificio "B", Ciudad Universitaria
C.P. 58040, Morelia, México
dmota@umich.mx

ABSTRACT

In this paper we present the application of a generalized finite difference Crank-Nicolson scheme to the numerical solution of the unsteady heat equation in $2+1$ dimensions subject to mixed Dirichlet and Robin conditions, a problem which has not been extensively studied when the spatial domain has an irregular shape. The generalized scheme is based on a second order difference scheme defined by an optimality condition, and it has been developed to solve Poisson-like equations whose domains are approximated by structured convex grids over very irregular regions generated by the direct variational method. Numerical examples showing the accuracy of the method are presented.

REFERENCES