ON THE ALGORITHM FOR THE NUMERICAL SIMULATION OF RADIATIVE COOLING, IN A 3-D ISOTROPIC SOLID

JOE HLOMUKA

Department of Mathematics and Applied Mathematics, University of Venda,
South Africa

Abstract: We consider a radiative cooling model [1] represented by a system of two nonlinear parabolic partial differential equations. The second equation is a dynamic boundary condition for the model, describing radiative heat energy transfer from the body of the solid through its surface. The two equations are linked by the identity: $\nabla u = \nabla_s[\gamma_0 u] + \gamma_1 u\mathbf{n}$; where u is the body absolute temperature, and $\gamma_0 u$ is the surface absolute temperature. While the first term on the right hand side of the identity is tangential to the surface of the solid, the second term is normal. We discretize the system using forward finite differences; thus deriving a numerical algorithm for the approximation of the unknown solution to the 3-D cooling model. The scheme is then tested for convergence and error stability. The l-D case for the model is considered in [3].

References

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