RESTORING BOUNDARY CONDITIONS IN HEAT CONDUCTION

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Abstract
In many physical problems the measurements of the temperature and the heat flux can experience practical difficulties and in some cases the relation between the temperature and the heat flux is unattainable. Physical examples include the measurement of the temperature and heat flux at a highly heated hostile boundary, the difficulty in determination of temperature over the surface of a space vehicle re-entering the atmosphere, etc.
This study describes the restoration of boundary conditions in transient heat conduction problems. In the formulation, the boundary conditions are represented by linear relations between the temperature and the heat flux, together with an initial condition of the temperature. Within this context, inverse problems which require finding the spacewise or timewise dependent ambient temperature appearing in the boundary conditions from additional terminal, integral or point observations at the boundary will be investigated. Analogous inverse problems, however nonlinear, which require finding the spacewise or timewise dependent heat transfer coefficient will also be addressed. Numerical results based on the boundary element method will be presented and discussed.