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Gisele Ruiz Goldstein* (ggoldste@memphis.edu), Department of Mathematical Sciences,
University of Memphis, Memphis, TN 38138. *Derivation and Interpretation of Kinetic Boundary
Conditions for the Heat and Wave Equations.*

Of concern are the heat and wave equations with kinetic boundary conditions. For the heat equation such boundary conditions model a heat source on the boundary. In this case a derivation will be given in which the boundary conditions arise naturally in the formulation of the problem. For the wave equation, kinetic boundary conditions arise from incorporating the effects of kinetic energy and potential energy on the boundary as well as inside the region; a derivation via classical methods of the calculus of variations and the physical interpretation of the kinetic boundary conditions will be given. All of the standard boundary conditions (Dirichlet, Neumann, and Robin) will be obtained as special cases of the kinetic boundary conditions. Connections between kinetic and general Wentzell boundary conditions will be discussed.

We shall also consider the wave equation with kinetic boundary conditions which incorporate the effect of friction. This will lead to an initial boundary value problem with nonlinear dynamic boundary conditions.

In addition we shall show that this problem is well-posed in a certain space. The results in this section are joint with Ciprian Gal and Jerome A. Goldstein. (Received August 30, 2005)