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1003-34-1619 **Kale Oyedeji*** (rohrs@math.gatech.edu), Morehouse College, Department of Physics, Atlanta, GA 30314-3773, **Sandra Rucker**, Clark Atlanta University, Atlanta, GA 30314, and **Ronald Mickens** (rohrs@math.gatech.edu), Clark Atlanta University, Department of Physics, Atlanta, GA 30314. *Exact Finite Difference Scheme for Second-Order, Linear ODE's Having Constant Coefficients.*

An important class of dynamical systems modeling phenomena in the natural and engineering sciences can be represented by linear, second-order, inhomogeneous ordinary differential equations for which boundary conditions are specified. In general, the coefficients and the inhomogeneous term are functions of the dependent variable. Since, for an arbitrary such ODE, useful closed forms do not exist for the exact solution, numerical methods must be applied to determine the required solution. The formulation of nonstandard finite difference schemes [1] begins with the construction of the exact finite difference scheme for the case where all coefficients are constant and the inhomogeneous term is zero. We show how to calculate the exact scheme for this case and then use it to construct discrete models for the general linear inhomogeneous, second-order ODE. This work was supported by a research from DOE.

[1] R. E. Mickens, Nonstandard Finite Difference Models of Differential Equations (World Scientific, 1994). (Received October 05, 2004)