1067-35-75 **Ronald E. Mickens*** (rohrs@math.gatech.edu), Clark Atlanta University, Physics Department, Atlanta, GA 30314. *Exact Discretization of Linearized Euler Equations in One Space Dimension.*

The one-space dimension, linearized Euler equations provide an excellent mathematical model for the testing of novel finite difference schemes[1] which may then be applied to more complex partial differential equations arising in acoustic propagation. A major feature of the linearized Euler equations is that their exact general solution is known. Our goal is to determine a corresponding exact finite difference scheme for the original PDE's. This is done by using the linear nature of the equations and the fact that the coefficients are constant. A consequence of these properties is that the "operator equation" for this problem can be factored. Thus by a proper selection of the partial difference operators the required exact discretization can be calculated. The basis of these results follow from the transformation of two first-order PDE's to a single second-order PDE.

References

1. John W. Goodrich, "Application of a New High Order Finite Difference Scheme to Acoustic Propagation with the Linearized Euler Equation," NASA Technical Memorandum 106454 (Lewis Research Center; Cleveland, OH; 1993).

2. R. E. Mickens, *Nonstandard Finite Difference Models for Differential Equations* (World Scientific, Singapore, 1994). (Received July 14, 2010)