1035-76-649 **Bashar Zogheib*** (zogheib@nova.edu), Nova Southeastern University, MST, Farquhar College of Arts and Sciences, 3301 College ave, Fort Lauderdale, FL 33314, and **R. M. Barron**, 401 Sunset ave, Department of Mathematics and Statistics, University of Windsor, Windsor, ON N9B3P4, Canada. *A Finite Difference Calculation Procedure for the Navier-Stokes Equation on a Staggered Cartesian Grid.*

A new finite difference numerical method for solving the two-dimensional, steady, incompressible, viscous flow equations on a staggered grid is presented in this paper. This methodology is finite difference based, but combines some of the best features of two numerical formulations, the finite difference and finite volume methods. Some weaknesses of the finite difference approach are removed by exploiting the strengths of the finite volume method. In particular, the issue of velocity-pressure coupling is dealt with in the proposed finite difference formulation by developing a pressure correction equation in a manner similar to the SIMPLE approach used in finite volume formulations. The advantages of this approach over traditional finite difference pressure calculation schemes, such as Chorin's artificial compressibility method or the use of a Poisson pressure equation, will be discussed. Moreover, since this is purely a finite difference formulation, numerical approximation of fluxes is not required. Results obtained from the present method are compared against exact solutions for flow in a straight duct. The new formulation is also validated against experimental and other numerical data for well-known benchmark problem, namely the flow over a backward-facing step. (Received September 12, 2007)