1106-65-110 **Xiaobing Feng**, **Chiu-Yen Kao** and **Thomas Lewis*** (tllewis3@uncg.edu). *Convergent Finite Difference Methods for Fully Nonlinear Second Order Partial Differential Equations.*

A new framework for designing and analyzing convergent finite difference methods for approximating both classical and viscosity solutions of second order fully nonlinear partial differential equations will be presented. The presented framework will extend the successful framework of monotone, consistent, and stable finite difference methods for first order fully nonlinear Hamilton-Jacobi equations to second order fully nonlinear PDEs such as Monge-Ampère and Bellman type equations. To this end, new concepts of consistency, generalized monotonicity, and stability will be introduced. The main component of the proposed framework is the concept of a "numerical operator", and the main tool for designing methods that satisfy the new framework is the concept of a "numerical moment". These two new concepts play the same roles the "numerical Hamiltonian" and the "numerical viscosity" play in the finite difference framework for first order fully nonlinear Hamilton-Jacobi equations. A class of methods that meets the requirements of the theoretical framework will be defined, and numerical results will be presented to validate the theoretical results. (Received July 17, 2014)