1067-65-382 **Brittany D. Froese*** (bdf1@sfu.ca) and **Adam M. Oberman**. *Finite Difference Methods for Viscosity Solutions of the Monge-Ampère Equation.*

The elliptic Monge-Ampère equation is a fully nonlinear Partial Differential Equation that originated in geometric surface theory and has been applied in dynamic meteorology, elasticity, geometric optics, image processing and image registration. Solutions may be singular, in which case standard numerical approaches can fail. Novel solution methods are required for stability and convergence to weak solutions.

In this talk we describe a monotone finite difference discretization for the Monge-Ampère equation, which provably converges to the weak (viscosity) solution. Solution accuracy is improved by using a hybrid discretization that selects either the convergent monotone discretization or a more accurate finite difference discretization in different regions of the computational domain. This discretization is determined *a priori* using regularity results. The resulting nonlinear equations are then solved by Newton's method.

Computational results in two and three dimensions validate the claims of both accuracy and solution speed. (Received August 30, 2010)