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Monday, November 5, 2018

Time: 4:00 p.m.

Location: Weber 223

Title: Fully Nonlinear Second Order PDEs and Their Numerical Solutions

Abstract: Fully nonlinear PDEs are referred to the class of nonlinear PDEs which are nonlinear in the highest order derivatives of the unknown functions appearing in the equations, they arise from many fields in science and engineering such as astrophysics, antenna design, differential geometry, geostrophic fluid dynamics, materials science, mathematical finance, meteorology, optimal transport, and stochastic control. This class of PDEs are known to be very difficult to study analytically and to approximate numerically. In this talk I will review and discuss some latest advances in developing efficient numerical methods for fully nonlinear second (and first) order PDEs such as the Monge-Ampere type equations and Hamilton-Jacobi-Bellman equations.

Background materials on the viscosity solution theory for fully nonlinear PDEs will be briefly reviewed. The focus of the talk will be on discussing various numerical approaches/methods/ideas and their pros and cons for constructing numerical methods which can reliably approximate viscosity solutions of fully nonlinear second order PDEs. Numerical experiments and application problems as well as open problems in numerical fully nonlinear PDEs will also be presented.

