Math 8590 Topics in PDEs
Viscosity Solutions

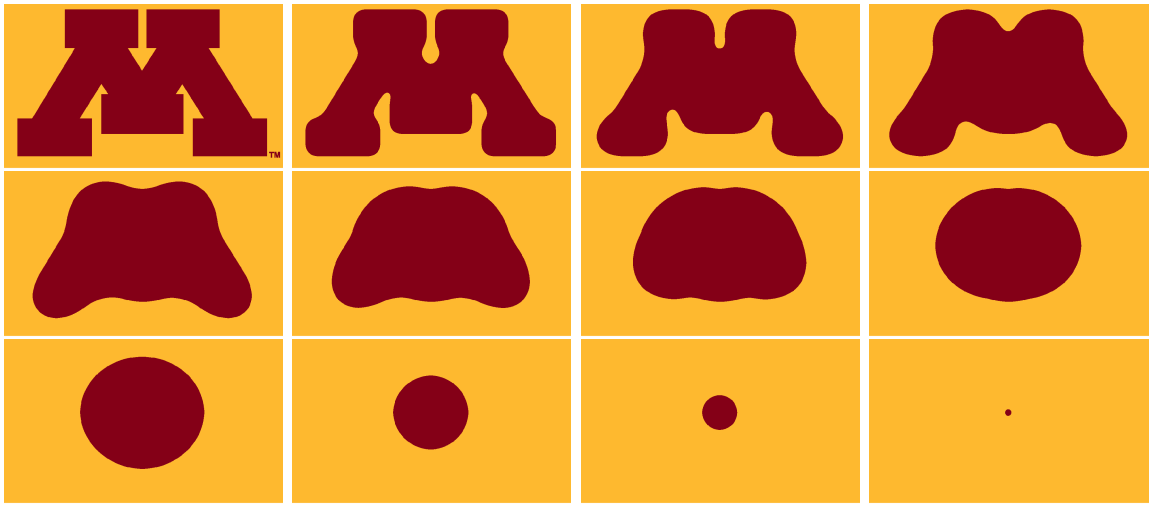
Fall, 2018
Instructor: Jeff Calder
MWF 2:30pm–3:20pm
Vincent Hall 207

This course will cover the theory of viscosity solutions for nonlinear first and second order partial differential equations (PDEs). The notion of viscosity solution is based on a comparison principle (or maximum principle), and is the natural notion of weak solution for many fully nonlinear PDEs of first and second order. Applications of viscosity solutions include problems in optimal control, differential games, mathematical finance, curvature motion of curves and surfaces, calculus of variations in L^∞, among many other problems.

This course will cover the comparison principle for viscosity solutions for first and second order PDEs, the method of vanishing viscosity, the Perron method, homogenization, a thorough study of monotone finite difference approximations for viscosity solutions, including convergence rates, and possibly other topics. We will mainly use the lecture notes here:

`http://www-users.math.umn.edu/~jwcalder/viscosity_solutions.pdf`

Grades will be determined based on a selection of homework problems and a final project or presentation. The prerequisites are a graduate course in real analysis and at least one semester of a graduate course in PDEs. Please contact the instructor (`jwcalder@umn.edu`) if you are interested in the course and do not have the prerequisites.



Mean curvature motion of the University of Minnesota M.