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Numerical approximation of first and second order non-linear elliptic PDEs

The theory of viscosity solutions gives powerful existence, uniqueness and stability results for first and second order degenerate elliptic equations. The approximation theory developed by Barles and Souganidis in the early nineties gave conditions for the convergence of numerical schemes.

Building on this work, we develop convergent schemes for non-linear second order equations, including: infinity laplacian, motion by mean curvature, the Monge–Ampere equation.

We'll also discuss adaptive schemes on unstructured grids for first order equations. A motivating example is the high-dimensional control problem of airplane flight.