DIFFUSIVE HAMILTON-JACOBI EQUATIONS AND THEIR SINGULARITIES

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I will give a survey of results on diffusive Hamilton-Jacobi equations, of the form $u_t - d\Delta u = |\nabla u|^p$ (or, more generally, with nonlinear diffusion).

Such equations arise in the viscous regularization of the Hamilton-Jacobi equations from control theory, as well as in KPZ type models for interface growth in ballistic deposition processes. They possess both global smooth and (gradient) blowup solutions, and display a variety of interesting behaviors.

We will in particular discuss the phenomenon of gradient blow-up (GBU) on the boundary and consider such issues as: localization of singularities, single-point GBU, Bernstein estimates, time rate of GBU, spatial GBU profiles, continuation in the viscosity sense after GBU and loss of boundary conditions.