Q. Han

Local solutions of degenerate Monge-Ampere equations and applications in geometry

Abstract: In this talk, I will present several new results concerning the local solvability of degenerate Monge-Ampere equations. The study of such a problem is motivated by local isometric embedding of surfaces in $\mathbb{R}^3$ and prescribing Gauss curvauture for surfaces in $\mathbb{R}^3$. A fundamental result was proved by C.-S. Lin that local solutions always exist if Gauss curvature changes its sign cleanly, i.e., its gradient is not zero. In this talk, I will present two conditions under which solutions can be proved to exist locally. These conditions are stated in terms of the zero set of Gauss curvature or some directional derivative of Gauss curvature. The first case is when Gauss curvature is nonpositive and some directional derivative satisfies some stability condition. The second case is when Gauss curvature changes its sign across a curve at the same order.