The Dirichlet problem for a singular elliptic equation arising in the level set formulation of the inverse mean curvature flow

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In this lecture we consider the Dirichlet problem associated with a nonlinear singular elliptic equation arising in the level set formulation of the inverse mean curvature flow; namely,

$$-\mathrm{div}\left(\frac{Du}{|Du|}\right)+|Du|=f\,.$$

We introduce a suitable concept of weak solution, for which we prove existence and uniqueness of the homogeneous Dirichlet problem in a bounded open set of $\mathbb{R}^N$, in the case $0\leq f\in L^q(\Omega)$, $q>N$. Moreover, examples of explicit solutions are shown.

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