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10. Partial Differential Equations

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Removable singularities for quasilinear degenerate elliptic equations with absorption terms

Let $N \geq 1$ and $p > 1$. Let F be a compact set and Ω be a bounded open set of $\mathbb{R}^N$ satisfying $F \subset \Omega \subset \mathbb{R}^N$. Define a generalized $p-$harmonic operator by

$$L_p u = -div(A(x)|\nabla u|^{p-2}\nabla u).$$

Here $A(x) \in C^1(\Omega')$ is positive in $\Omega \setminus F$ and vanishes in Int F. Assume that $u \in C^0(\Omega') \cap C^2(\Omega \setminus F)$ satisfies in the distribution sense

$$L_p u + B(x)Q(u) = f, \qquad \text{in } \Omega \setminus F$$

for some nonnegative function $B(x)$ and a nonlinear term $Q(t)$. Then we shall show under some additional conditions that

$$\limsup_{x \to \partial F} |u(x)| < +\infty. \text{ Removability of singularities}$$

We also study the Dirichlet boundary problem for this equation and establish the unique existence of the bounded solution.

References T. Horiuchi: Existence of bounded solutions for semilinear degenerate elliptic equations with absorption term. Proc. Japan Acad., 74, Ser. A (1998).