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Bounded Solutions to p-Poisson Equations

In joint work with S. Rodney, we present sufficient conditions for boundedness of solutions to Dirichlet problems for the p-Poisson equation

$$-\mathrm{div}(|\nabla u|^{p-2}\nabla u) = f$$

on a bounded domain $\Omega \subset \mathbb{R}^n$. In particular, we show that if the data function f belongs to an Orlicz space $L^{\Psi}(\Omega)$ for a Young function Ψ satisfying an integral condition, then any weak solution u is essentially bounded in Ω with

$$\sup_{\Omega} |u| \leq C\|f\|_{L^{\Psi}(\Omega)}.$$

Generalizations of this result to degenerate elliptic p-Poisson equations with drift terms are also discussed.