A comparison result for solutions of anisotropic elliptic problems via symmetrization

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Abstract

In the last years, there has been an increasing interest in the study of anisotropic problems in calculus of variations and in
partial differential equations motivated by their applications to mathematical models in various branches of applied science.

We treat the following class of anisotropic problems

$$\begin{cases} -div\left(a\left(x,u,\nabla u\right)\right)=f\left(x\right)-div \quad g\left(x\right) & \text{in } \Omega \\ u=0 & \text{on } \partial\Omega, \end{cases}$$

where Ω is a bounded open subset of $\mathbb{R}^N$
$N \geq 2$, $a : \Omega \times \mathbb{R} \times \mathbb{R}^N \to \mathbb{R}^N$
is a Carathéodory function such that, for a.e. $x \in \Omega$,

$$a(x,\eta,\xi)\cdot\xi \geq \Phi\left(\xi\right) \quad \text{for } (\eta,\xi) \in \ \mathbb{R}\times\mathbb{R}^N$$

with Φ an $N-$dimensional Young function, and the data f and g are measurable functions fulfilling a suitable summability condition.

Our aim is to obtain a comparison result for solutions to this class of problems by means of anisotropic symmetrization. As consequence we deduce a priori estimates for norms of the relevant solutions.

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