

A DUALITY APPROXIMATION OF SOME NONLINEAR PDE'S*

Dan Tiba[†]

Abstract

We discuss a discretization approach for the p - Laplacian equation and a variational inequality associated to fourth order elliptic operators, via a meshless approach based on duality theory.

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1 Introduction

We consider the well known p - Laplacian boundary value problem, expressed in the variational form (minimization of energy) via the Dirichlet principle:

$$\text{Min}_{y \in W_0^{1,p}(\Omega)} \left\{ \frac{1}{p} \int_{\Omega} [|\nabla y|^p + |y|^p] dx - \int_{\Omega} f y dx \right\}, \quad (1)$$

where $\Omega \subset R^d$ is a bounded domain and $p > d \geq 2$ is given, $f \in L^q(\Omega)$ with $\frac{1}{p} + \frac{1}{q} = 1$.

The space $W_0^{1,p}(\Omega)$ is the usual Sobolev space.

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[†]dan.tiba@imar.ro, Institute of Mathematics, Romanian Academy, Bucharest and Academy of Romanian Scientists;