ON THE SOLVABILITY OF DIRICHLET PROBLEM FOR THE WEIGHTED $p$-LAPLACIAN

DOMINIK MIELCZAREK, JERZY RYDELEWSKI AND EWA SZLACHTOWSKA

AGH University of Science and Technology
Faculty of Applied Mathematics
al. Mickiewicza 30, 30–059 Kraków, Poland

e-mail: dmielczas@wms.mat.agh.edu.pl
ry@agh.edu.pl
szlachto@agh.edu.pl

Abstract

In this paper we are concerned with the existence and uniqueness of the weak solution for the weighted $p$-Laplacian. The purpose of this paper is to discuss in some depth the problem of solvability of Dirichlet problem, therefore all proofs are contained in some detail. The main result of the work is the existence and uniqueness of the weak solution for the Dirichlet problem provided that the weights are bounded. Furthermore, under this assumption the solution belongs to the Sobolev space $W^{1,p}_0(\Omega)$.

Keywords: weighted $p$-Laplacian, weak solutions, solvability, semi-inner product spaces.

2010 Mathematics Subject Classification: 35A15, 35J20, 35J60.

References


Received 31 January 2014