

MULTIPLE SOLUTIONS FOR A NON-HOMOGENEOUS
NEUMANN BOUNDARY-VALUE PROBLEM

ILDIKÓ-ILONA MEZEI and LIA SĂPLĂCAN

Abstract. In this paper we obtain multiple solutions in double weighted Sobolev spaces for a non-homogeneous elliptic semilinear eigenvalue problem on unbounded domain. We use a very recent Ricceri type critical points theorem proved by Kristály, Marzantowicz, Varga in [4].

MSC 2010. 35J20, 46E35.

Key words. semilinear elliptic equation, eigenvalue problem, variational methods, unbounded domain, weighted Sobolev space.

REFERENCES

- [1] BONANNO, G., *Some remarks on a three critical points theorem*, *Nonlinear Anal.*, **54** (2003), 651–665.
- [2] BRÉZIS, H., *Analyse fonctionnelle. Théorie et applications*, Masson, Paris, 1983.
- [3] KRISTÁLY, A. and VARGA, CS., *On a class of quasilinear eigenvalue problems in \mathbb{R}^N* , *Math. Nachr.*, **278** (2005), 1756–1765.
- [4] KRISTÁLY, A., MARZANTOWICZ, W. and VARGA, CS., *A non-smooth three critical points theorem with applications in differential inclusions*, *J. Global Optim.*, **46** (2010), 49–62.
- [5] LISEI, H., HORVÁTH, A. and VARGA, CS., *Multiplicity results for a class of quasilinear eigenvalue problems on unbounded domain*, *Arch. Math. (Basel)*, **90** (2008), 256–266.
- [6] MEZEI, I.I., *Multiple solutions for a double eigenvalue semilinear problem in double weighted Sobolev spaces*, *Studia Univ. Babeş-Bolyai Math.*, **53** (2008), 33–48.
- [7] MEZEI, I.I. and VARGA, CS. *Multiplicity result for a double eigenvalue quasilinear problem on unbounded domain*, *Nonlinear Anal.*, **69** (2008), 4099–4105.
- [8] MONTEFUSCO, E. and RĂDULESCU, V., *Nonlinear eigenvalue problems for quasilinear operators on unbounded domains*, *Nonlinear Differ. Equ. Appl.*, **8** (2001), 481–497.
- [9] PFLÜGER, K., *Existence and multiplicity of solutions to a p -Laplacian equation with nonlinear boundary condition*, *Electron. J. Differ. Equ.*, **1998** (1998), 1–13.
- [10] PFLÜGER, P., *Compact traces in weighted Sobolev space*, *Analysis (Munich)*, **18** (1998), 65–83.
- [11] PFLÜGER, K., *Semilinear Elliptic Problems in Unbounded Domains: Solutions in weighted Sobolev Spaces*, Institut für Mathematik I, Freie Universität Berlin, Preprint no. 21, 1995.
- [12] RICCERI, B., *On a three critical points theorem*, *Arch. Math. (Basel)*, **75** (2000), 220–226.
- [13] RICCERI, B., *A three critical points theorem revisited*, *Nonlinear Anal.*, **70**(2008), 3084–3089.

Received April 27, 2009
Received September 22, 2009

“Babeş-Bolyai” University
Faculty of Mathematics and Computer Science
Str. M. Kogălniceanu nr. 1
400084 Cluj Napoca, Romania
E-mail: mezeiildi@yahoo.com

“Petru Rareş” High School
Str. Obor 10A
425100 Beclean, Romania
E-mail: liasaplacan@yahoo.com