

© 2017 Heldermann Verlag
Journal of Convex Analysis 24 (2017) 769–793

N. S. Papageorgiou

Department of Mathematics, National Technical University, Zografou Campus, Athens 15780,
Greece
npapg@math.ntua.gr

V. D. Rădulescu

Institute of Mathematics, Romanian Academy of Sciences, P. O. Box 1-764, 014700 Bucharest,
Romania
vicentiu.radulescu@imar.ro

Asymmetric, Noncoercive, Superlinear $(p, 2)$ -Equations

We examine a nonlinear nonhomogeneous Dirichlet problem driven by the sum of a p -Laplacian ($p \geq 2$) and a Laplacian (a $(p, 2)$ -equation). The reaction term is asymmetric and it is superlinear in the positive direction and sublinear in the negative direction. The superlinearity is not expressed using the Ambrosetti-Rabinowitz condition, while the asymptotic behavior as $x \rightarrow -\infty$ permits resonance with respect to any nonprincipal eigenvalue of $(-\Delta_p, W_0^{1,p}(\Omega))$. Using variational methods based on the critical point theory and Morse theory (critical groups), we prove a multiplicity theorem producing three nontrivial solutions.

Keywords: $(p, 2)$ -equation, asymmetric reaction, superlinear growth, multiple solutions, nonlinear regularity, critical groups.

MSC: 35J20, 35J60, 58E05