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Journal of Convex Analysis 26 (2019) 1145–1174

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Positive Solutions for Nonlinear Robin Problems with Concave Terms

We consider a parametric Robin problem driven by the p -Laplacian plus a potential. In the reaction we have the combined effects of a parametric concave term and of a $(p-1)$ -linear perturbation. We consider the case of uniform nonresonance with respect to the principal eigenvalue $\hat{\lambda}_1 > 0$ and the case of nonuniform nonresonance with respect to $\hat{\lambda}_1 > 0$. For both cases we prove a bifurcation-type theorem describing the dependence on the parameter $\lambda > 0$ of the set of positive solutions. We also establish the existence of a smallest positive solution \hat{u}_λ^* for every admissible parameter $\lambda > 0$ and determine the monotonicity and continuity properties of the map $\lambda \mapsto \hat{u}_\lambda^*$.

Keywords: p -Laplacian, concave nonlinearity, uniform nonresonance, nonuniform nonresonance, bifurcation-type theorem, minimal positive solution.

MSC: 35J20, 35J60