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Multiple constant sign and nodal solutions for nonlinear Neumann eigenvalue problems

DUMITRU MOTREANU, VIORICA V. MOTREANU
AND NIKOLAOS S. PAPAGEORGIOU

Abstract. We consider a nonlinear Neumann eigenvalue problem driven by a possibly nonhomogeneous differential operator which incorporates as a special case the p-Laplacian. We assume that the right-hand side nonlinearity is $(p-1)$-superlinear, but need not satisfy the Ambrosetti-Rabinowitz condition or to be monotone. We show that, for all values of the parameter λ in an upper half line, the problem has two positive and two negative solutions. Subsequently, for the case of the p-Laplacian, we also produce a nodal solution. Finally, for the semilinear case we show that the problem has two nodal solutions.

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