
ON THE SPECTRUM OF A NONLINEAR TRANSMISSION PROBLEM WITH DIFFERENT GROWTH CONDITIONS

Luminița Barbu¹, Raluca Gabriela Turtoi^{2*}

¹University „Ovidius” of Constanța

²Romanian Naval Academy "Mircea cel Bătrân", University „Ovidius” of Constanța

ABSTRACT

This work focuses on the spectral analysis of a nonlinear transmission problem involving nonhomogeneous operators acting in adjacent subdomains Ω_i , $i = \overline{1, 2}$ and coupled through interface conditions on Σ . There are different growth rates p_i , $i = \overline{1, 2}$ of the operators in each region and we also have boundary conditions on Γ_i , $i = \overline{1, 2}$.

The main result establishes that, under suitable assumptions, every positive real number λ is an eigenvalue of the transmission problem. The proof relies on variational techniques and has two different growth regimes.

In the superlinear case, suitable estimates are used to obtain compactness properties of the associated energy functional, which allow the application of the Mountain Pass Theorem and guarantee the existence of nontrivial critical points.

In the sublinear case, the existence of eigenfunctions follows from the coercivity and a minimization method.

Keywords Mountain Pass Theorem · variational methods · nonlinear transmission problem

References

- [1] L. Barbu, A. Burlacu and G. Moroșanu, On an eigenvalue problem associated with the (p, q) -Laplacian. An. Șt. Univ. Ovidius Constanța 32 (2024), no. 1, 45–63.
- [2] L. Barbu, G. Moroșanu and C. Pinte, A nonlinear elliptic eigenvalue-transmission problem with Neumann boundary condition. Ann. Mat. Pura Appl. 198 (2019), 821–836.
- [3] G. B. Folland, Real analysis: modern techniques and their applications, 2nd edn. Wiley, New York, 1999.
- [4] N. S. Papageorgiou and S. T. Kyritsi, Handbook of applied analysis. Springer, New York, 2009.
- [5] P. H. Rabinowitz, Minimax methods in critical point theory with applications to differential equations. AMS, Providence, 1986.

*raluca.turtoi@365.univ-ovidius.ro