# An application of the Lyapunov-Schmidt method to semilinear elliptic problems

Ngo Q.A.

Department of Mathematics, Mechanics and Informatics, College of Science, Vietnam National University, Hanoi, Viet Nam

Abstract: In this paper we consider the existence of nonzero solutions for the undecoupling elliptic system -??u = ?u + ??v + f(u,v), -??v = ??u + ??v + g(u,v), on a bounded domain of $?^n$, with zero Dirichlet boundary conditions. We use the Lyapunov-Schmidt method and the fixed-point principle. ?? 2005 Texas State University - San Marcos.

Author Keywords: Elliptic system; Fixed-point principle; Lyapunov; Schmidt; Semilinear

Year: 2005

Source title: Electronic Journal of Differential Equations

Volume: 2005

Page count: 8

Link: Scorpus Link

Correspondence Address: Ng??, Q.A.; Department of Mathematics, Mechanics and Informatics, College of Science, Vietnam National University, Hanoi, Viet Nam; email: bookworm_vn@yahoo.com

ISSN: 10726691

Language of Original Document: English

Abbreviated Source Title: Electronic Journal of Differential Equations

Document Type: Article

Source: Scopus

Authors with affiliations:

1. Ng??, Q.A., Department of Mathematics, Mechanics and Informatics, College of Science, Vietnam National University, Hanoi, Viet Nam

References:

1. Ahmad, S., Lazer, A., Paul, J., Elementary critical point theory and perturbation of elliptic boundary value problems at resonance (1976) Indiana Univ. Math. J., 25, pp. 933-944
2. Ambrosetti, A., Mancini, G., Existence and multiplicity results for nonlinear elliptic problems with linear part at resonance. The case of the simple eigenvalue (1978) J. Diff. Equations, 28, pp. 220-245
3. Anane, A., (1988) Etude des Valeurs Propers et la Resonance Pour le Operateur P-laplacian, , Ph. D. Thesis, Univ. Bruxelles
4. Brown, K.J., Spatially inhomogeneous steady-state solutions for systems of equations describing interacting populations (1983) J. Math. Anal. Appl., 95, pp. 251-264
5. Berestycki, H., De Figueiredo, D., Double resonance in semilinear elliptic problems (1981) Comm. Partial Diff. Equations, 6, pp. 91-120
6. Bartolo, P., Benci, V., Fortunato, D., Abstract critical point theorems and applications to some nonlinear problems with strong resonance (1983) Nonlinear Analysis T.M.A., 7 (9), pp. 981-1012

7. Capozzi, A., Lupo, D., Solimini, S., On the existence of a nontrivial solution to nonlinear problem at resonance (1989) Nonlinear Analysis T.M.A., 13 (2), pp. 151-163
8. Cesari, L., Kannan, R., Qualitative study of a class of nonlinear boundary value problems at resonance (1985) J. Diff. Equations, 56, pp. 63-81
9. Chiappinelli, R., Mawhin, J., Nugari, R., Bifurcation from infinity and multiple solutions for some Dirichlet problems with unbounded nonlinearities Nonlinear Analysis T.M.A, , in press
10. Chow, S., Hale, J., (1982) Methods of Bifurcation Theory, , Springer-Verlag
11. Costa, D., Magalh?es, A variational approach to subquadratic perturbations of elliptic systems (1994) J. Diff. Equations, 111 (1), pp. 103-122
12. De Figueiredo, D., Chiappinelli, R., Bifurcation from infinity and multiple solutions for an elliptic system (1993) Differential and Integral Equations, 6 (4), pp. 757-771
13. De Figueiredo, D., Gossez, J., Resonance below the first eigenvalue for a semilinear elliptic problem (1988) Math. Ann., 281, pp. 589-610
14. De Figueiredo, D., Mitidieri, E., A maximum principle for an elliptic system and applications to semilinear problems (1986) Siam. J. Math. Anal., 17, pp. 836-849
15. Gossez, J., Some nonlinear differential equations at resonance at first eigenvalue (1979) Conf. Sem. Mat. Univ Bari, 167, pp. 355-389
16. Hern?ndez, J., Maximum principles and decoupling for positive solutions of reaction-diffusion systems (1990) Oxford University Press, pp. 199-224. , K. J. Brown and A. Lacey eds
17. Hoang, Q.T., On a system of semilinear elliptic equations on an unbounded domain Vietnam Journal of Mathematics, , to appear
18. Hoang, Q.T., Ng??, Q.A., Existence of Positive Solution for a System of Semilinear Elliptic Differential Equations on an Unbounded Domain, , submitted to NoDEA
19. Iannacci, R., Nkashama, M., Nonlinear boundary value problems at resonance (1987) Nonlinear Analysis T.M.A., 11, pp. 455-473
20. Iannacci, R., Nkashama, M., (1987) Nonlinear Second Order Elliptic Partial Differential Equations at Resonance, , Report 87-12, Memphis State University
21. Krasnosels'kii, M., Zabreico, F., (1984) Geometrical Methods of Nonlinear Analysis, , Springer-Verlag
22. Landesman, E., Lazer, A., Nonlinear perturbation of elliptic boundary value problems at resonance (1970) J. Math. Mech., 19, pp. 609-623
23. Lazer, A., Mckenna, P.J., On steady-state solutions of a system of reaction-diffusion equations from biology (1982) Nonlinear Analysis T.M.A., 6, pp. 523-530
24. Lupo, D., Solimini, S., A note on a resonance problem (1986) Proc. Royal Soc. Edinburgh, 102 A, pp. 1-7
25. Mawhin, J., (1989) Bifurcation from Infinity and Nonlinear Boundary Value Problems, in Ordinary and Partial Differential Equations, 2, pp. 119-129. , Sleeman and Jarvis eds, Longman, Ifarlow
26. Mawhin, J., Schmitt, K., Landesman-Lazer type problems at an eigenvalue of odd multiplicity (1988) Results in Math., 14, pp. 138-146
27. Mawhin, J., Schmitt, K., Nonlinear eigenvalue problems with the parameter near resonance (1990) Ann. Polon. Math., 51, pp. 241-248
28. Ng??, Q.A., (2005), College graduation thesis, H? N??oi - V??et NamNg??, Q.A., Existence of Positive Solution of Semilinear Elliptic Equations on a Bounded Domain, , in preparation

29. Nirenberg, L., (1974) Topics in Nonlinear Functional Analysis, , New York
30. Omari, P., Zanolin, F., A note on nonlinear oscillations at resonance (1987) Acta Math. Sinica, 3, pp. 351-361
31. Rabinowitz, P., (1986) Minimox Methods in Critical Point Theory with Applications to Differential Equations, , CBMS 65 Regional Conference Series in Math, A.M.S
32. Rothe, F., Global existence of branches of stationary solutions for a s system of reaction-diffusion equations from biology (1981) Nonlinear Analysis T.M.A., 5, pp. 487-498
33. Schechtbr, M., Nonlinear elliptic boundary value problems at resonance (1990) Nonlinear Analysis T.M.A., 14 (10), pp. 889-903
34. Smoller, J., (1983) Shock Waves and Reaction-diffusion Equations, , Springer-Verlag
35. Solimini, S., On the solvability of some elliptic partial differential equations with the linear part at resonance (1986) J. Math. Anal Appl., 117, pp. 138-152
36. Vargas, C., Zuluaga, M., On a nonlinear Dirichlet problem type at resonance and birfucation (1992) PDEs, Pitmat Research, Notes in Mathematics, 273, pp. 248-252
37. Vargas, C., Zuluaga, M., A nonlinear elliptic problem at resonance with a nonsimple eigenvalue (1996) Nonlinear Analysis T.M.A., pp. 711-721
38. Zuluaga, M., A nonlinear elliptic system at resonance (1994) Dynamic Systems and Applications, 3 (4), pp. 501-510
39. Zuluaga, M., Nonzero solutions of a nonlinear elliptic system at resonance (1996) Nonlinear Analysis T.M.A, 31 (3-4), pp. 445-454
40. Zuluaga, M., On a nonlinear elliptic system: Resonance and birfucation cases (1999) Comment. Math. Univ. Caroliae, 40 (4), pp. 701-711