

## EXISTENCE OF SOLUTIONS FOR THE COUPLED SYSTEMS OF SECOND AND FOURTH ORDER ELLIPTIC EQUATIONS

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*Abstract.* In this paper, under the nonquadraticity condition, we obtain two existence theorems of nontrivial solutions for a coupled system of second and fourth order elliptic equations.

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### REFERENCES

- [1] Y. K. AN, *Mountain pass solutions for the coupled systems of second and fourth order elliptic equations*, *Nonlinear Anal.*, **63** (2005), 1034–1041.
- [2] Y. K. AN, X. L. FAN, *On the coupled system of second and fourth order elliptic equations*, *Appl. Math. Comput.*, **140**, (2-3) (2003), 341–351.
- [3] Y. K. AN, *Nonlinear perturbations of a coupled system of steady state suspension bridge equations*, *Nonlinear Anal.*, **51**, 7 (2002), 1285–1292.
- [4] N. U. AHMED, H. HARBI, *Mathematical analysis of dynamic models of suspension bridges*, *SIAM J. Appl. Math.*, **58**, 3 (1998), 853–874.
- [5] P. BARTOLO, V. BENCI, D. FORTUNATO, *Abstract critical point theorems and applications to some nonlinear problems with "strong" resonance at infinity*, *Nonlinear Anal.*, **7**, 9 (1983), 981–1012.
- [6] D. G. COSTA, C. A. MAGALHAES, *Variational elliptic problems which are nonquadratic at infinity*, *Nonlinear Anal.*, **23**, 11 (1994), 1401–1412.
- [7] G. CERAMI, *Un criterio de esistenza per i punti critici su varieta ilimitate*, *Rc. Ist. Lomb. Sci. Lett.*, **112** (1978), 332–336.
- [8] Q. H. CHOI, T. JUNG, *A nonlinear suspension bridge equation with nonconstant load*, *Nonlinear Anal.*, **35**, 6 (1999), 649–668.
- [9] Q. H. CHOI, T. JUNG, P. J. MCKENNA, *The study of a nonlinear suspension bridge equation by a variational reduction method*, *Appl. Anal.*, **50**, 1-2 (1993), 73–92.
- [10] P. DRABEK, H. LEINFELDER, G. TAJCOVA, *Coupled string-beam equations as a model of suspension bridges*, *Appl. Math.*, **44**, 2 (1999), 97–142.
- [11] Z. DING, *Nonlinear periodic oscillations in a suspension system under periodic external aerodynamic forces*, *Nonlinear Anal.*, **49** (2002), 1079–1097.
- [12] S. HILL, L. D. HUMPHREYS, *Mountain pass solutions for a system of partial differential equations: an existence theorem with computational results*, *Nonlinear Anal.*, **39** (2000), 731–743.
- [13] A. C. LAZER, P. J. MCKENNA, *Global bifurcation and a theorem of Tarantello*, *J. Math. Anal. Appl.*, **181**, 3 (1994), 648–655.
- [14] A. C. LAZER, P. J. MCKENNA, *Large-amplitude periodic oscillations in suspension bridges: some new connections with nonlinear analysis*, *SIAM Rev.*, **32**, 4 (1990), 537–578.
- [15] P. J. MCKENNA, W. WALTER, *Nonlinear oscillations in a suspension bridge*, *Arch. Rational Mech. Anal.*, **98**, 2 (1987), 167–177.
- [16] A. M. MICHELETTI, A. PISTOIA, *Nontrivial solutions for some fourth order semilinear elliptic problems*, *Nonlinear Anal.*, **34**, 4 (1998), 509–523.
- [17] A. M. MICHELETTI, A. PISTOIA, *Multiplicity results for a fourth-order semilinear elliptic problem*, *Nonlinear Anal.*, **31**, 7 (1998), 895–908.