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Existence of solutions to nonlinear Hammerstein integral equations and applications. (English) Zbl 1104.45003

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Authors' abstract: The authors study the existence and multiplicity of solutions of the operator equation $Kfu = u$ in the real Hilbert space $L^2(G)$. Under certain conditions on the linear operator K , they establish the conditions on f which are able to guarantee that the operator equation has at least one solution, a unique solution, and infinitely many solutions, respectively. The monotone operator principle and the critical point theory are employed to discuss this problem. The quadratic root operator $K^{1/2}$ and its properties play an important role. As an application, the authors investigate the existence and multiplicity of solutions to fourth-order boundary value problems for ordinary differential equations with two parameters, and give some new existence results of solutions.

Reviewer: Yves Cherruault (Paris)

MSC:

45G10 Other nonlinear integral equations

34B15 Nonlinear boundary value problems for ordinary differential equations

Cited in **32** Documents

Keywords:

strongly monotone operator principle; mountain pass Lemma; linking theorem; fourth-order boundary value problem; nonlinear integral equations; existence of solution; Hilbert space; critical point theory

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References:

- [1] Bai, Z.; Wang, H., On positive solutions of some nonlinear fourth-order beam equations, J. math. anal. appl., 270, 357-368, (2002) · [Zbl 1006.34023](#)
- [2] Deimling, K., Nonlinear functional analysis, (1985), Springer-Verlag Berlin · [Zbl 0559.47040](#)
- [3] Guo, D., Nonlinear functional analysis, (2001), Shandong Sci. & Tec. Press, (in Chinese)
- [4] Li, F.; Liang, Z.; Zhang, Q., Existence of solutions to a class of nonlinear second order two-point boundary value problems, J. math. anal. appl., 312, 357-373, (2005) · [Zbl 1088.34012](#)
- [5] Li, F.; Zhang, Q.; Liang, Z., Existence and multiplicity of solutions of a kind of fourth-order boundary value problem, Nonlinear anal., 62, 803-816, (2005) · [Zbl 1076.34015](#)
- [6] Li, Y., Positive solutions of fourth-order boundary value problems with two parameters, J. math. anal. appl., 281, 477-484, (2003) · [Zbl 1030.34016](#)
- [7] Rabinowitz, P.H., Minimax methods in critical point theory with applications to differential equations, () · [Zbl 0152.10003](#)
- [8] Rabinowitz, P.H., Some critical point theorems and applications to semilinear elliptic partial differential equations, Ann. scuola normale sup. Pisa, class scienza, 4, 215-223, (1978) · [Zbl 0375.35026](#)
- [9] Rabinowitz, P.H., Some minimax theorems and applications to nonlinear partial differential equations, (), 161-177
- [10] Struwe, M., Variational methods: applications to nonlinear partial differential equations and Hamiltonian systems, (1996), Springer-Verlag Berlin · [Zbl 0864.49001](#)
- [11] Taylor, A.E.; Lay, D.C., Introduction to functional analysis, (1980), Wiley
- [12] Willem, M., Minimax theorems, (1996), Birkhäuser · [Zbl 0856.49001](#)
- [13] Zeidler, E., Nonlinear functional analysis and its applications, III: variational methods and optimization, (1985), Springer-Verlag New York · [Zbl 0583.47051](#)
- [14] Zeidler, E., Nonlinear functional analysis and its applications, I: fixed-point theorems, (1986), Springer-Verlag New York

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