*Fixed Point Theory*, Volume 8, No. 1, 2007, 59-68
http://www.math.ubbcluj.ro/~nodeacj/sfptcj.html

# LOCALIZATION RESULTS VIA KRASNOSELSKII'S FIXED POINT THEOREM IN CONES

ANDREI HORVAT-MARC

North University of Baia Mare
Department of Mathematics and Computer Science
Victoriei 76, 340072 Baia Mare, Romania
E-mail: hmand@personal.ro, hmandrei@yahoo.com

**Abstract.** The purpose of this paper is to give an existence result for the nonlinear fourth-order boundary value problem

$$u^{(4)}(t) = f(u(t)), \quad t \in [0,1]$$
$$u(0) = u(1) = A,$$
$$u''(0) = u''(1) = B$$

where $f : [0,\infty) \to \mathbb{R}$ is continuous and $A$, $B$ are positive real numbers. We use a result related to the existence of positive solutions for nonlinear integral equations in Banach spaces, presented in [7].

**Key Words and Phrases**: ordered Banach space, fourth-order boundary value problem, Krasnoselskii's compression-expansion fixed point theorem.
**2000 Mathematics Subject Classification**: 34B18, 45N05, 47H10.

## References

[1] R. P. Agarwal, Haishen Lü and D. O'Regan, *An upper and lower solutions method for the one-dimensional singular p-Laplacian*, Memoirs on Differential Equations and Mathematical Physics, **28**(2003), 13-31.

[2] R. Agarwal, M. Meehan, D. O'Regan and R. Precup, *Location of nonnegative solutions for differential equation on finiteand semi-infinite intervals*, Dynamic Systems Appl., **12**(2003), 323-341.

[3] R. I. Avery, J. M. Davis, and J. Henderson, *Three symmetric positive solutions for Lidstone problems by a generalization of the Leggett-Williams theorem*, Electronic Journal of Differential Equations, Vol. **2000**(2000), 1-15.

[4] M. Conti, L. Merizz and S. Terracini, *Remarks on variational methods and lower-upper solutions*, Nonlinear Differential Equations and Applications, **6**(1999), 371-393.

[5] Y. Egorov and V. Kondratiev, *On Spectral Theory of Elliptic Operators*, Birkhauser Verlag, Basel-Boston-Berlin, 1996.

[6] D. Guo, V. Lakshmikantham and X. Liu, *Nonlinear Integral Equation in Abstract Spaces*, Kluwer Academic Publishers, Dordrecht-Boston-London, 1996.

[7] A. Horvat-Marc and R. Precup, *Nonnegative solutions on nonlinear integral equation in ordered Banach spaces*, Fixed Point Theory, **5**(2004), 65-70.

[8] A. Horvat-Marc, *Nonnegative solutions for boundary value problem*, Bul. Ştiinţ. Univ. Baia Mare, Ser. B, Matematică Informatică, Vol. **18**(2002), 223-228.

[9] A. Horvat-Marc, *Variational method for a second order boundary value problem*, Mathematical Research, Vol. 9, Proceedings of the Fourth International Conference "Tools for Mathematical Modeling" June 23-28, 2003, 249-254.

[10] Liu Yuji and Ge Weigao, *Solvability on a nonlinear four-point boundary-value problem for a fourth order differential equation*, Taiwanese J. Math., **7**(2003), 591-604.

[11] Liu Yuji and Ge Weigao, *Positive solutions of boundary-value problems for 2M-order differential equations*, Electronic J. of Diff. Eq., Vol. **2003**(2003), 1-12.

[12] M. Meehan and D. O'Regan, *Multiple nonnegative solutions of nonlinear integral equation on compact and semi-infinite intervals*, Applicable Analysis, **74**(2000), 413-427.

[13] L.C. Piccinini, G. Stampacchia and G. Vidossich, *Ordinary Differential Equations in* $\mathbb{R}^n$*, Problems and Methods*, Springer-Verlag, New-York, 1984.

[14] D. O'Regan and R. Precup, *Existence criteria for integral equations in Banach spaces*, J. of Inequal. and Appl., **6**(2001), 77-97.

[15] R. Precup, *Methods in Nonlinear Integral Equations*, Kluwer Academic Publishers, Dordrecht-Boston-London, 2002.

*Received: January 26, 2005; Accepted: August 16, 2006.*