

A MULTIPLICITY RESULT OF POSITIVE SOLUTIONS FOR THIRD-ORDER MULTI-POINT BOUNDARY VALUE PROBLEM

YANG LIU AND QIAO ZONGMIN

Department of Mathematics, Hefei Normal University
Hefei, 230061 P. R. China
E-mail: xjiangfeng@163.com

Abstract. By using fixed point theorem, multiple positive solutions for third-order multi-point boundary value problem with nonlinearity depending on all order derivative are established. The associated Green's function is also given.

Key Words and Phrases: Multi-point boundary value problem, positive solution, cone, fixed point.

2010 Mathematics Subject Classification: 34B10, 34B15.

Acknowledgement. The work is sponsored by the Anhui Provincial Natural Science Foundation (10040606Q50) and the Natural Science Foundation of Anhui Educational Department (KJ2010A285)

REFERENCES

- [1] M. Gregus, *Third Order Linear Differential Equations*, in: Math. Appl., Reidel, Dordrecht, 1987.
- [2] D.R. Anderson, *Multiple positive solutions for a three-point boundary value problem*, Math. Comput. Modelling, **27**(6)(1998), 49-57.
- [3] A.P. Palamides, G. Smyrlis, *Positive solutions to a singular third-order three-point boundary value problem with an indefinitely signed Green's function*, Nonlinear Anal., **68**(2008), 2104-2118.
- [4] L. Guo, J. Sun and Y. Zhao, *Existence of positive solutions for nonlinear third-order three-point boundary value problems*, Nonlinear Anal., **68**(2008), 3151-3158.
- [5] B. Hopkins, N. Kosmatov, *Third-order boundary value problems with sign-changing solutions*, Nonlinear Anal., **67**(2007), 126-137.
- [6] D.R. Anderson, *Green's function for a third-order generalized right focal problem*, J. Math. Anal. Appl., **288**(2003), 1-14.
- [7] J. Chu, Z. Zhou, *Positive solutions for singular non-linear third-order periodic boundary value problems*, Nonlinear Anal., **64**(2006), 1528-1542.
- [8] J.R. Graef, L. Kong, *Positive solutions for third order semi-positone boundary value problems*, Appl. Math. Lett., **22**(2009), 1154-1160.
- [9] X. Lin, Z. Du and W. Liu, *Uniqueness and existence results for a third-order nonlinear multi-point boundary value problem*, Appl. Math. Comput., **205**(2008), 187-196.
- [10] Q. Yao, *Positive solution for a semi-linear third-order two-point boundary value problem*, Appl. Math. Lett., **17**(2004), 1171-1175.

- [11] R.I. Avery, A.C. Peterson, *Three positive fixed points of nonlinear operators on an ordered Banach space*, *Comput. Math. Appl.*, **208**(2001), 313-322.

Received: March 21, 2010; Accepted: October 14, 2010.

