

EXISTENCE OF SOLUTIONS OF A NONLINEAR THIRD ORDER BOUNDARY VALUE PROBLEM

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Abstract. This paper deals with a third-order three-point boundary value problem. Applying the Banach contraction principle and Leray Schauder nonlinear alternative, we establish the existence of solutions for the considered problem.

Key Words and Phrases: Fixed point theorem, three-point boundary value problem, non trivial solution, third-order equation.

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REFERENCES

- [1] R.P. Agarwal, *Focal boundary value problems for differential and difference equations*, Kluwer Academic Publ., 1998.
- [2] D.R. Anderson, *Green's function for a third-order generalized right focal problem*, J. Math. Anal. Appl., **288**(2003), 1–14.
- [3] D. Anderson and R. Avery, *Multiple positive solutions to third-order discrete focal boundary value problem*, Acta Math. Appl. Sinica, **19**(2003), 117–122.
- [4] M. Benchohra, J.J. Nieto and A. Ouahab, *Second-order boundary value problem with integral boundary conditions*. Boundary Value Problems, Vol 2011, ID 260309, 9 pages.
- [5] K. Deimling, *Nonlinear Functional Analysis*, Springer, Berlin, 1985.
- [6] J.R. Graef, Bo Yang, *Existence and nonexistence of positive solutions of a nonlinear third order boundary value problem*, Electronic J. Qualitative Theory Diff. Eq., Proc. 8'th Coll. Qualitative Theory of Diff. Equ., **9**(2008), 1–13.
- [7] A. Guezane-Lakoud, S. Kelaiaia, *Solvability of a three-point nonlinear boundary value problem*, Electronic J. Diff. Eq., **2010**(2010), no. 139, 1–9.
- [8] A. Guezane-Lakoud and R. Khaldi, *Study of a third-order three-point boundary value problem*, AIP Conf. Proc., **1309**(2010), 329–335.
- [9] L.J. Guo, J.P. Sun, and Y.H. Zhao, *Existence of positive solutions for nonlinear third-order three-point boundary value problem*, Nonlinear Anal., **68**(2008), 3151–3158.
- [10] B. Hopkins and N. Kosmatov, *Third-order boundary value problems with sign-changing solutions*, Nonlinear Anal., **67**(2007), 126–137.
- [11] S. Li, *Positive solutions of nonlinear singular third-order two-point boundary value problem*, J. Math. Anal. Appl., **323**(2006), 413–425.

- [12] R. Ma, *A survey on nonlocal boundary value problems*, Applied Math. E-Notes, **7**(2007), 257–279.
- [13] Y. Sun, *Positive solutions of singular third-order three-point boundary value problem*, J. Math. Anal. Appl., **306**(2005), 589–603.

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