

Existence of positive solutions for the fourth-order nonlinear ordinary differential systems with two parameters

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Abstract: In this work, we study the existence of positive solutions of the following boundary value problem for the fourth order nonlinear differential systems with two parameters:

$$\begin{cases} u^{(4)}(t) + \beta_1 u''(t) - \alpha_1 u(t) - \gamma_1 v(t) - \mu_1 h_1(t) f(u(t), v(t)) = 0, \\ v^{(4)}(t) + \beta_2 v''(t) - \alpha_2 v(t) - \gamma_2 u(t) - \mu_2 h_2(t) g(u(t), v(t)) = 0, \\ u(0) = u(1) = u''(0) = u''(1) = 0, \\ v(0) = v(1) = v''(0) = v''(1) = 0, \end{cases} \quad (1)$$
$$\begin{cases} u(0) = u(1) = u''(0) = u''(1) = 0, \\ v(0) = v(1) = v''(0) = v''(1) = 0, \end{cases} \quad (2)$$

where $\beta_i, \alpha_i, \gamma_i$ are three positive constants and $\mu_i > 0$ with $i = 1, 2$, $f, g \in C(R^+, R^+, R^+)$ and $h_i \in C([0, 1], R^+)$

Keywords: positive solution, system of fourth order boundary value problem, Krasnosel'skii fixed point theorem, Green's function, variable parameters

References:

- [1] R. Agarwal, B. Kovacs, D.O. Regan, Existence of positive solution for a sixth-order differential system with variable parameters, J. Appl. Math Comput., pp.1-18, 2013.
- [2] Z. Bai, W. Ge, Y. Wang, The method of lower and upper solutions for some fourth-order equations, Journal of Inequalities in Pure and Applied Mathematics 5, pp.1-8, 2004.
- [3] G. Chai, Existence of positive solutions for fourth-order boundary value problem with variable parameters, Nonlinear Analysis, 66, pp. 870-880, 2007.
- [4] X. Dong, Z. Bai, Positive solutions of fourth-order boundary value problem with variable parameters, J. Nonlinear sci. Appl., 1, pp.21-30, 2008.
- [5] Y. Guo, F. Yang, Y. Liang, Positive solutions for nonlocal fourth-order boundary value problems with all order derivatives, Boundary Value Problems 2012:29, pp. 1-12, 2012.
- [6] Y. Li, Positive solutions of fourth-order boundary value problems with two parameters, J. Math. Anal. Appl., 281, pp. 477-484, 2003.
- [7] Y. Li, H. Yang, An existence and uniqueness result for a bending beam equation without growth restriction, Abstract and Applied Analysis, vol. 2010, pp. 1-9, 2010.