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Positive solutions for nonlinear singular third order boundary value problem. (English)

Zbl 1221.34059

Commun. Nonlinear Sci. Numer. Simul. 14, No. 2, 424-429 (2009).

Summary: We investigate the problem of existence of positive solutions for the nonlinear third order boundary value problem

$$u'''(t) + \lambda a(t)f(u(t)) = 0, \quad t \in (0, 1),$$

$$u(0) = u'(0) = 0, \quad \alpha u'(1) + \beta u''(1) = 0,$$

where λ is a positive parameter. By using Krasnoselskii's fixed-point theorem in cones, we establish various results on the existence of positive solutions of the boundary value problem. Under various assumptions on $a(t)$ and $f(u(t))$, we give the intervals of the parameter λ which yield the existence of the positive solutions. An example is also given to illustrate the main results.

MSC:

- [34B16](#) Singular nonlinear boundary value problems for ordinary differential equations
- [34B18](#) Positive solutions to nonlinear boundary value problems for ordinary differential equations
- [47N20](#) Applications of operator theory to differential and integral equations

Cited in **13** Documents

Keywords:

third order boundary value problem; Krasnoselskii's fixed-point theorem; Green's function; positive solution

Full Text: [DOI](#)

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