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一类具非局部边值条件的四阶非线性微分方程的对称正解

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摘要 本文研究了一类四阶非线性微分方程非局部边值问题对称正解的存在性,在某些适当的增长性条件下应用Krasnoselskii's 不动点定理证明了单个正解和两个正解的存在性,所得结果是新的,
未见有对四阶非线性微分方程非局部边值问题对称正解的存在性的研究.

关键词 对称正解 非局部边值问题 不动点定理 积分边界条件

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Symmetric positive solutions for a fourth-order nonlinear differential equation with nonlocal boundary conditions

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Abstract In this paper we shall consider the nonlocal boundary value problem for nonlinear fourth-order ordinary differential equation of the form \begin{eqnarray*}& & u''''(t)=g(t)f(t,u(t)),\quad 0<t<1,\& &u(0)=u(1)=\int_0^1a(s)u(s)ds,\&&u''(0)=u''(1)=\int_0^1b(s)u''(s)ds, \end{eqnarray*} where $a,b\in L^1[0,1],\ g:(0,1)\to [0,\infty)$ is continuous, symmetric on $(0,1)$ and maybe singular at $t=0$ and $t=1$. $ f:[0,1]\times[0,\infty)\to[0,\infty)$ is continuous and $f(\cdot,x)$ is symmetric on $[0,1]$ for all $x\in[0,\infty)$. Under some suitable growth conditions, we show the existence and multiplicity of symmetric positive solutions of above problem by applying Krasnoselskii's fixed point theorem in a cone.

Key words Symmetric positive solution nonlocal boundary value problem fixed point theorem integral boundary conditions

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