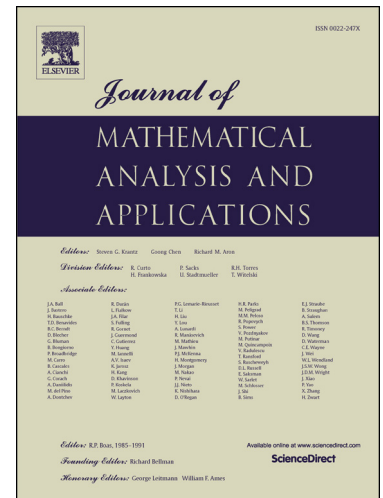




Indefinite weight nonlinear problems with Neumann boundary conditions[☆]

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Dedicated to Professor Pierpaolo Omari on his 60th birthday

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Abstract

We present a multiplicity result of positive solutions for the Neumann problem associated with a second order nonlinear differential equation of the form $u'' + a(t)g(u) = 0$, where the weight function $a(t)$ has indefinite sign. The only assumption we make for the nonlinear term $g(u)$ is that its primitive $G(u)$ presents some oscillations at infinity, expressed by the condition involving $\liminf G(u)/u^2 = 0 < \limsup G(u)/u^2$. As an application, we obtain multiple radially symmetric solutions for Neumann problems associated with $\Delta u + a(x)g(u) = 0$.

Keywords: Neumann problem, indefinite weight, positive solutions, radial solutions.

2010 MSC: 34B15, 34B18, 34C35, 35J60.

1. Introduction

We deal with the study of positive solutions for indefinite ordinary differential equations with Neumann boundary conditions on a compact interval $[0, T]$. More in detail the problem analyzed is the following:

$$(\mathcal{P}) \quad \begin{cases} u'' + a(t)g(u) = 0, \\ u(t) > 0, \quad \forall t \in [0, T], \\ u'(0) = u'(T) = 0. \end{cases}$$

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