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### ACCEPTED MANUSCRIPT

# Indefinite weight nonlinear problems with Neumann boundary conditions $\overset{k}{\approx}$

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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  $\underline{\lim} G(u)/u^2 = 0 < \underline{\lim} G(u)/u^2$ . 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:



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

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