

## GLOBAL BIFURCATION IN NONLINEAR DIRAC PROBLEMS WITH SPECTRAL PARAMETER IN THE BOUNDARY CONDITION

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ABSTRACT. In this paper we consider nonlinear eigenvalue problems for a one-dimensional Dirac equation with spectral parameter in the boundary condition. We investigate local and global bifurcations of nontrivial solutions to these problems. The existence of unbounded continua of nontrivial solutions bifurcating from points and intervals of the line of trivial solutions is shown.

### 1. Introduction

We consider the nonlinear eigenvalue problem for the Dirac equation

$$(1.1) \quad \ell w(x) \equiv Bw'(x) - P(x)w(x) = \lambda w(x) + h(x, w(x), \lambda), \quad 0 < x < \pi,$$

subject to the boundary conditions

$$U(\lambda, w) = \begin{pmatrix} U_1(w) \\ U_2(\lambda, w) \end{pmatrix}$$

given by

$$(1.2) \quad U_1(w) := (\sin \alpha, \cos \alpha) w(0) = v(0) \cos \alpha + u(0) \sin \alpha = 0,$$

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