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BIFURCATION TECHNIQUES FOR FOURTH ORDER m-POINT BOUNDARY VALUE PROBLEMS

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Abstract. By employing bifurcation techniques, this paper investigates the existence of nontrivial solutions for fourth order m-point boundary value problems. Our results improve those in the literature.

Keywords. Bifurcation technique; Nontrivial solutions; Sign-changing nonlinear term; Global behavior; m-point boundary value problems.

AMS (MOS) subject classification: 34B15; 47J05.

1 Introduction

The existence of solutions of the second order multi-point boundary value problems has been studied by many authors using the nonlinear alternative of Leray-Schauder, coincidence degree theory, fixed point theorem in cones and global bifurcation techniques (see [1], [2], [3], [4], [5], [7], [12], [13], [15], [18], [19], [20], [21] and references therein). Bifurcation phenomena is a sudden qualitative or topological change in some system's behaviour, which occur in some given families. Examples of such families are the integral curves of a family of vector fields or, the solutions of a family of differential equations. They cannot be detected purely by a stability analysis of the equilibria (fixed points). Up to now, bifurcations have been intensively studied in the literature (this information can be easily obtained from the internet). In particular, Rabinowitz (see [10], [11]) showed that bifurcation from both the trivial solution and infinity has global consequences. This theory has been successfully applied to Sturm-Liouville problems for ordinary differential equations, integral equations, and partial differential equations (see for example, [3], [5], [7],[6] [12] and references therein).

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