

SOME EXISTENCE RESULTS FOR NONRESONANT DIFFERENCE EQUATIONS ON INFINITE INTERVALS SUBJECT TO NONLOCAL BOUNDARY CONDITIONS

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ABSTRACT. In this work we provide conditions for the existence of solutions to nonlinear boundary value problems of the form

$$x_{k+1} = A_k x_k + f(k, x_k), \quad k \in \mathbb{N}_0 := \{0, 1, \dots\},$$

subject to boundary conditions

$$\sum_{k=0}^{\infty} B_k x_k = G(x).$$

We will show that under appropriate assumptions on each A_k , f , each B_k , and G , $\ell^p(\mathbb{N}_0, \mathbb{R}^n)$ solutions will exist for $p \in [1, \infty]$.

1. Introduction

In this paper, we provide criteria for the solvability of nonlinear multipoint boundary value problems of the form

$$(1.1) \quad x_{k+1} = A_k x_k + f(k, x_k), \quad k \in \mathbb{N}_0 := \{0, 1, \dots\},$$

subject to boundary conditions

$$(1.2) \quad \sum_{k=0}^{\infty} B_k x_k = G(x).$$

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