Weak Heteroclinic Solutions of Discrete Nonlinear Problems of Kirchhoff Type with Variable Exponents

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Abstract: We prove the existence of weak heteroclinic solutions for discrete nonlinear problems of Kirchhoff type. The proof of the main result is based on a minimization method.

Keywords: *nonlinear difference equation, heteroclinic solution, anisotropic problems, Kirchhoff, critical points.*

Mathematics Subject Classification (2010): 47A75; 35B38; 35P30; 34L05; 34L30.

1   Introduction

In this paper, we study the following nonlinear discrete anisotropic problem

$$\begin{cases} -M(A(k-1,\Delta u(k-1)))\Delta(a(k-1,\Delta u(k-1))) \\[2mm] +\alpha(k)|u(k)|^{p(k)-2}u(k) = \delta(k)f(k,u(k)), \ k \in \mathbb{Z}^*, \\[2mm] u(0)=0, \quad \lim_{k\to-\infty} u(k) = -1, \quad \lim_{k\to+\infty} u(k) = 1, \end{cases} \qquad (1)$$

where $\Delta u(k) = u(k+1) - u(k)$ is the forward difference operator, $\mathbb{Z}^* = \{k \in \mathbb{Z} : k \neq 0\}$ and $M, a, \alpha, \delta, f, p$ are functions to be defined later.

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