

Global structure and one-sign solutions for second-order Sturm-Liouville difference equation with sign-changing weight

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Abstract

This paper is devoted to study the discrete Sturm-Liouville problem
$$-\Delta(p(k)\Delta u(k-1)) + q(k)u(k) = \lambda m(k)u(k) + f_1(k, u(k), \lambda) + f_2(k, u(k), \lambda), \quad k \in [1, T]_{\mathbb{Z}},$$

$$a_0 u(0) + b_0 \Delta u(0) = 0, \quad a_1 u(T) + b_1 \Delta u(T) = 0,$$
 where $\lambda \in \mathbb{R}$ is a parameter, $f_1, f_2 \in C([1, T]_{\mathbb{Z}} \times \mathbb{R}^2, \mathbb{R})$, f_1 is not differentiable at the origin and infinity. Under some suitable assumptions on nonlinear terms, we prove the existence of unbounded continua of positive and negative solutions of this problem which bifurcate from intervals of the line of trivial solutions or from infinity, respectively.

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