JOST SOLUTION AND SPECTRUM OF THE DISCRETE STURM-LIOUVILLE EQUATIONS WITH HYPERBOLIC EIGENPARAMETER

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Abstract

In this paper, we consider the boundary value problem (BVP) for the discrete Sturm-Liouville equation

$$a_{n-1}y_{n-1} + b_n y_n + a_n y_{n+1} = \lambda y_n, n \in \mathbb{N} \tag{1}$$

$$(\gamma_0 + \gamma_1\lambda)y_1 + (\beta_0 + \beta_1\lambda)y_0 = 0 \tag{2}$$

where (a_n) and (b_n), $n \in \mathbb{N}$ complex sequences, $\gamma_i, \beta_i \in \mathbb{C}$, $i = 0, 1$. By taking λ as a hyperbolic eigenparameter, we obtain exponantial type Jost solution of this BVP (1)-(2). Discussing the analytical properties and asymptotic behaviour of Jost solution, we prove that this boundary value problem has a continous spectrum filling the segment $[-2, 2]$. We also prove that BVP (1)-(2) has finite number of eigenvalues and spectral singularities.

Keywords: Difference equations, Eigenparameter, Spectral analysis, Jost solution, Discrete equations

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