

Criteria for Asymptotic Stability of Three-Term Linear Difference Equation with Two Parameters

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Abstract

Asymptotic stability analysis of linear difference equations with constant coefficients is closely connected to the study of asymptotic stability of numerical methods for initial value problems in ordinary differential equations. We investigate the asymptotic stability of the three-term difference equation

$$y(n+k) + \alpha y(n+k-m) + \beta y(n) = 0, \quad n = 0, 1, 2, \dots,$$

where $\alpha, \beta \in \mathbb{C}$, $k, m \in \mathbb{N}$, $k > m \geq 1$. Its asymptotic stability is characterized by all roots of the associated characteristic polynomial lying inside the unit circle. The talk surveys known results, presents graphical stability regions for selected real parameters, and comments on approaches to asymptotic stability analysis.

References

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