# Stability Analysis of Difference Differential Equations Using the Second Lyapunov's Method

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## Abstract

Difference differential systems of delay and neutral equations are considered. Constructive conditions of asymptotic stability for linear stationary systems are obtained and estimations of exponential damping are given. The second Lyapunov's method is used for stability analysis. Particularly, the method of finite-dimensional Lyapunov's quadratic functions with an exponential factor and the method of Lyapunov-Krasovsky functionals are used. Asymptotic stability conditions are formulated in terms of inequalities with eigenvalues of positively definite symmetric matrixes, arising in the functions (functionals). An optimization problem of nonlinear programming is solved to determine these matrixes numerically.

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