About stability loss of zero solution

in one boundary-value problem

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Let us consider one boundary-value problem with linear deviate in enge condition

(1)

(2)

where , .

Boundary-value problem (1), (2) has the trivial solution. Depending on the values of parameters, this balance state might be stable or unstable. The main ways of stability loss of trivial solution are divergent, when a zero appears in the stability spectrum of balance state, and oscillating, when a pair of eigenvalues appears on imaginary axis of complex plane. Our task was to find critical values of initial parameters and , when there is the stability loss of trivial solution of boundary-value problem (1), (2).

For the task there were used analytical and numerical methods of research. For numerical research of oscillating stability loss of zero balance state there was considered a chain of connected oscillators, which simulates boundary-value problem (1), (2)

(3)

(4)

Index of oscillator is determined proceeding from shift in boundary condition (2).

The numerical research was carried out by means of special software. All calculations were performed on a large number of independent streams of CPU.

As a result there were found some critical values of initial parameters and , when zero balance state of problem (3), (4) lost its stability. In addition for divergent and oscillating of stability loss there were constructed equations for the amplitude of oscillations of zero balance state of linearized problem (1), (2).

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**References**

1. Kaschenko S.A. About bifurcations with small disturbances in logistic equation with delay // Modelling and Analysis of Information Systems, v.24, №2, p. 168 – 185 (2017).