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A PROBLEM OF MODAL CONTROL IN A LINEAR NEUTRAL SYSTEM

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Abstract. A problem of modal control is considered for a class of linear multidimensional differential delay systems of neutral type. The control vector is sought in the form that results in a given in advance characteristic equation of the closed system. The problem is completely solved for systems of a special form, the so-called *canonical* systems. A two-dimensional example is considered in full detail.

Keywords. Linear neutral systems, modal control, characteristic equation, stability, canonical form.

AMS (MOS) subject classification: 34K35, 49K25

1 Introduction

A problem of modal control for linear stationary systems of differential equations without delay of the form

$$\dot{x}(t) = Ax(t) + bu(t), \quad u(t) = c^T x(t), \quad t \geq 0$$

is to find the control parameters $c^T = (c_1, c_2, \ldots, c_n)$ that make the characteristic quasi-polynomial

$$\tilde{f}_n(\lambda) = \lambda^n + q_1\lambda^{n-1} + \cdots + q_{n-1}\lambda + q_n$$

of the closed system

$$\dot{x}(t) = (A + bc^T)x(t), \quad t \geq 0$$

to have given in advance zeros $\lambda_1^0, \lambda_2^0, \ldots \lambda_n^0$. Since $q_1, q_2, \ldots q_n$ are uniquely determined from the roots of the characteristic equation, the problem can be stated in terms of a control over the coefficients. This means that one seeks parameters $c_i, i = \overline{1,n}$, such that the characteristic equation of the closed system has given in advance coefficients.