ESTIMATION OF DOMAIN STABILITY FOR DIFFERENTIAL-DIFFERENCE SYSTEMS WITH QUADRATIC RIGHT-HAND SIDES

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Stability of trivial solution of system of nonlinear differential equations with quadratic right-hand side

$$\dot{x}(t) = Ax(t-\tau) + X^T(t)Bx(t-\tau) \tag{1}$$

is considered. In (1) we suppose $t \geq 0$, τ is a positive constant, $x \in \mathbb{R}^n$, A is a square constant matrix. Matrices $X^T(t)$ and B are $n \times n^2$ and $n^2 \times n$ rectangular matrices

$$X^T(t) := \{X_1^T(t), X_2^T(t), ..., X_n^T(t)\}, \;\; B := \{B_1, B_2, ..., B_n\}.$$

We suppose that square matrices B_i, $i = 1, \ldots, n$ are constant and symmetric, and all elements of square matrices $X_i^T(t)$, $i = 1, \ldots, n$ are zeros except of i-th line which equals $x^T(t) = (x_1(t), x_2(t), ..., x_n(t))$. We give conditions for stability, estimation of domain of stability and estimation of rate of convergence of solutions.