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ON THE NECESSARY AND SUFFICIENT CONDITIONS FOR THE STABILITY OF LINEAR SYSTEMS OF GENERALIZED ORDINARY DIFFERENTIAL EQUATIONS

Consider the linear system of generalized ordinary differential equations

$$dx(t) = dA(t) \cdot x(t), \tag{1}$$

where $A : [0, +\infty[\to \mathbb{R}^{n\times n}$ is a real matrix function with locally bounded variation components.

By a solution of system (1) we understand a vector function $x : [0, +\infty[\to \mathbb{R}^{\kappa}$ with locally bounded variation such that

$$x(t) = x(s) + \int_s^t dA(\tau) \cdot x(\tau) \quad (0 \le s < t < +\infty),$$

where $\int_s^t dA(\tau) \cdot x(\tau)$ is the Lebesgue–Stieltjes integral.

The theory of generalized ordinary differential equations enables one to investigate ordinary differential, difference and impulsive equations from the unified standpoint.

The necessary and sufficient conditions are found for the stability (uniform stability, asymptotic stability or the so-called ξ-exponential asymptotic stability) of system (1).