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Section:

9. Ordinary Differential Equations and Dynamical Systems

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Computationally verifiable conditions of the existence of stabilizable solutions for linear differential systems with periodic parameters

We consider the system $\dot{x}(t) - P(t)x[t - \Delta(t)] + f(t), t \in [0, \infty)$, (1) where $x(\xi) = 0$, if $\xi < 0$, $n \times n$-matrix P, functions Δ and f are T-periodic, $\Delta(t) \geq 0$. A solution $x_\alpha(t)$, $\alpha \in R^n$ of (1) defined by the condition $x(0) = \alpha$, is said to be stabilizable to a T-periodic function $y : [0, \infty) \rightarrow R^n$ if $\lim_{N\rightarrow\infty} \max_{t\in[NT,(N+1)T]} \| x_\alpha(t) - y(t)\|_{R^n} = 0$. The conditions of the existence of stabilizable solutions x_α as well as an equation defining the T-periodic function y are obtained. The sufficiently high precision of the constructed approximation $\tilde{C}(t, s)$ to the Cauchy matrix $C(t, s)$ of (1) on $[0, T]$ allows to establish the existence of a stabilizable solution x_α and to give efficiently computable upper estimates for the values $\theta(\alpha, N) = \max_{t\in[NT,(N+1)T]} \| x_\alpha(t)y(t)\|$.

Reference: V. P. Maksimov and J. S. P. Munembe, On the question of enclosing solutions of linear functional differential systems, Memoirs of Differential Equations and mathematical Physics 12(1997), pp149-156, Tbilisi.