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9. Ordinary Differential Equations and Dynamical Systems

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L^p-Perturbation of Linear Functional Differential Equations

The asymptotic behaviour is studied of a class of linear retarded functional differential equations, $x'(t) = L(t, x_t)\,(t \geq t_0)$. An equation is said to be exponentially dominated if it has a solution $x_0(t) = \exp\{\int_{t_0}^{t} \lambda(s)ds\}$ on $[t_0 - r, \infty)$ and every solution has the asymptotic form $x(t) = \{c + o(e^{-\alpha t})\}x_0(t)$ as $t \to \infty$, where $\alpha > 0$ is independent of x but c is a constant dependent on x. Classes of equations that are exponentially dominated have been found. Moreover, it is shown that L^p-perturbations of equations of these classes, $x'(t) = L(t, x_t) + \tilde{L}(t, x_t)$ with $\int_{t_0}^{\infty} \|\tilde{L}(t, \cdot)\|^p dt < \infty\,(p \geq 1)$, are still exponentially dominated on $[T, \infty)$ when $T \geq t_0$ is large enough.