Exponential Stability And Instability In Nonlinear Volterra Integro-differential Equations With Functional Delay

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Abstract

We use Lyapunov functionals to obtain sufficient conditions that guarantee exponential stability of the zero solution of the Volterra integro-differential equation with functional delay

\[ x'(t) = - \int_{t-r(t)}^{t} a(t, s)g(x(s))ds \]

where the functions \( a(t, s) \) and \( g(x) \) are continuous on their respective domains and \( 0 < r(t) < r_0 = 1/2 \). In addition, we will arrive at some conditions that characterize the instability of the zero solution.