Distributed delay differential equations – numerical approach

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We will present a new solution strategy for distributed delay differential equations, i.e.

\[ \dot{x}(t) = f \left( t, \int_0^\infty x(t - s)g(s)ds \right), \]  

(1)

where \( g \) is a density of some nonnegative random variable. There is a well-known [1] way to transform equation (1) to a system of ordinary differential equations in the case that \( g \) is a density of gamma distribution.

We will show that a density of a nonnegative random variable can be approximated by a sum of densities of gamma distributions. This result can be extended to solve equation (1) numerically.

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References