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Asymptotic behavior of solutions to a Volterra equation

In this talk we study the asymptotic behavior of solutions to the equation

\[
\begin{cases}
  u'(t) = Au(t) + \int_0^t a(t-s)Au(s)ds, & t \geq 0 \\
  u(0) = x,
\end{cases}
\]

(1)

where \( a(t) := a \frac{t^{\mu-1}}{\Gamma(\mu)} e^{-\beta t}, \alpha, \beta, \mu \in \mathbb{R} \). Under appropriate assumptions on \( \alpha, \beta, \mu \) and \( A \) we prove that the solution \( u \) to equation (1) is uniform exponential stable, that is, there exist \( C, \omega > 0 \) such that for each \( x \in D(A) \), the solution \( \|u(t)\| \leq Ce^{-\omega t}\|x\| \) for all \( t \geq 0 \).