Tian, Hongjiong

The exponential asymptotic stability of singularly perturbed delay differential equations with a bounded lag. (English) Zbl 1014.34062

J. Math. Anal. Appl. 270, No. 1, 143-149 (2002).

The author considers the singularly perturbed delay differential system:

$$\varepsilon y'(t,\varepsilon)=f(t,y(t,\varepsilon),y(t-\tau(t),\varepsilon)),\quad t\geq t_0,\qquad y(t,\varepsilon)=\varphi(t),\quad t\leq t_0,$$

with $f:[0,+\infty)\times\mathbb{C}^s\times\mathbb{C}^s\to\mathbb{C}^s$ and $y(t,\varepsilon):\mathbb{R}^+\times\mathbb{R}^+\to\mathbb{C}^s$.

Sufficient conditions are provided to ensure that any solution to this system with a bounded lag is exponentially stable uniformly for sufficiently small $\varepsilon>0$. As a preliminary result, a generalized Halanay inequality is derived.

Reviewer: Sergiy Yanchuk (Kyïv)

MSC:

34K20 Stability theory of functional-differential equations

34K26 Singular perturbations of functional-differential equations

34K12 Growth, boundedness, comparison of solutions to functional-differential equations

Keywords:

exponential asymptotic stability; bounded lag; uniform stability; singular perturbation; Halanay inequality

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