Hu, Guang-Da
Stability criteria of high-order delay differential systems. (English) Zbl 1453.93177
Int. J. Control 93, No. 9, 2095-2103 (2020).

Summary: In this paper, the delay-dependent stability of linear, high-order delay differential systems is investigated. First, two bounds of the unstable eigenvalues of the systems are derived. The two bounds are based on the spectral radius and the norms of the parameter matrices of the systems, respectively. We emphasise that the bounds of the unstable eigenvalues involve only the spectral radius and norms of the matrices of lower size. They can be obtained with much less computational effort and work well in practice for large problems. Then, using the argument principle, a computable stability criterion is presented which is a necessary and sufficient condition for the delay-dependent stability of the systems. Furthermore, a numerical algorithm is provided for checking the delay-dependent stability of the systems. Numerical examples are given to illustrate the main results.

MSC:

93D05 Lyapunov and other classical stabilities (Lagrange, Poisson, \( L^p, l^p \), etc.) in control theory
93C43 Delay control/observation systems
93C23 Control/observation systems governed by functional-differential equations
34K06 Linear functional-differential equations
34K20 Stability theory of functional-differential equations

Keywords:
delay-dependent stability; high-order delay differential system; bounds of unstable eigenvalues; argument principle

Full Text: DOI

References:


© 2022 FIZ Karlsruhe GmbH


This reference list is based on information provided by the publisher or from digital mathematics libraries. Its items are heuristically matched to zbMATH identifiers and may contain data conversion errors. It attempts to reflect the references listed in the original paper as accurately as possible without claiming the completeness or perfect precision of the matching.