Imaginary Axis Eigenvalues of a Delay System with Applications in Stability Analysis

Z. Zahreddine

[1] *Department of Basic Sciences, College of Arts & Sciences, University of Sharjah, Sharjah, P.O. Box 27272,*

Received: June 18, 2003; Revised: May 6, 2004

Abstract: We present a matrix method for determining the imaginary axis eigenvalues of a delay differential system. Both neutral and retarded delay systems are considered. We produce a second order polynomial matrix which is singular for all imaginary axis eigenvalues of the delay system leading to the recovery of eigenvectors associated with imaginary axis eigenvalues. The use of Kronecker products is emphasized in the proofs. Examples are given to illustrate the applicability of the new results in stability analysis.

Keywords: *Delay systems; stability analysis; Kronecker products; imaginary axis eigenvalues.*

Mathematics Subject Classification (2000): 34A25, 34C20; 34A09, 93D99.