Assessing Stability of Time-Delay Systems using Rational Functions

Mauricio de Oliveira
UCSD

Friday, January 9, 3pm, Bldg EBU2, Rm 479

In this talk we will discuss how stability of an infinite-dimensional linear time-delay system can be assessed by studying the stability of an associated finite-dimensional linear system. The basic idea is to use an integer power of the linear fractional transformation to substitute for the transcendental terms in the characteristic equation of the delay system. The resulting rational function can be seen as a finite Padé type approximant. The novelty is that finite bounds on the degree of the truncation can be obtained if the maximum allowed time-delay is also assumed to be finite. The conclusion is that in order to analyze stability of some types of delay systems it suffices to analyze the roots of a rational function instead of the roots of the a transcendental function.

Mauricio de Oliveira is an Adjunct Assistant Professor with the Department of Mechanical and Aerospace Engineering at University of California San Diego. He works in the broader area of systems and control, with various interests in robust filtering and control, optimization, signal processing and tensegrity structures. He obtained his Ph.D. degree in Electrical Engineering in 1999 at the University of Campinas, Brazil, and has published some thirty papers in journals and some sixty or so conference papers.