Stability analysis of fractional adaptive systems: Motivation, advances and main challenges

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Abstract

This talk will address the stability analysis of fractional adaptive schemes, which correspond to the identification and/or control of partially known systems. In these adaptive schemes, the fractional operators can appear describing the system to be controlled/identified and/or in the formulation of the controller/estimator.

A general description of adaptive systems will be introduced first, followed by the key problems found in their stability analysis. Thus, the analysis tools contained in [1, 2] will be addressed, together with their corresponding impact not only for the particular problem of adaptive schemes, but also in the stability analysis of many other fractional systems.

Finally, some unsolved challenge topics in the field of stability and convergence analysis of fractional adaptive systems will be stated.

References

[1] N. Aguila-Camacho, M. A. Duarte-Mermoud, J. Gallegos, Lyapunov functions for fractional order systems, Communications in Nonlinear Science and Numerical Simulation 19 (2014) 2951–2957.

[2] M. A. Duarte-Mermoud, N. Aguila-Camacho, J. Gallegos, R. Castro-Linares, Using general quadratic Lyapunov functions to prove Lyapunov uniform stability for fractional order systems, Communications in Nonlinear Science and Numerical Simulation 22 (2015) 650–659.