

Open Invited Track Stability and Control of Fractional Order Systems

Organizers:

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Abstract: This open invited track is dedicated to the recent developments on stability and control of fractional order systems, as well as to the recent developments in design of fractional order controllers.

IFAC technical committee for evaluation: TC 2.2

Open Invited Track identification code:

Detailed description:

Stability is arguably the most important property of dynamical systems. However, it is not an easy concept and can be defined in numerous ways. In case of integer order systems (of finite order), all notions of stability can be related to one another in a very straightforward way, and analysis can be performed by algebraic methods, e.g. by localizing all poles of the transfer function of the linear and time-invariant system under consideration. In case of fractional order systems (FOS) and systems described by irrational transfer functions, this is no longer the case. There are subtle, important differences between various concepts: exponential stability, BIBO stability, H-infinity stability, etc. In the last decades, many advances have been reported in this field, such as criteria for investigating stability of commensurate-order fractional system, and many classes of incommensurate order systems, delayed fractional order systems, etc.

Moreover, from the feedback control point of view, stability is the first requirement among several specifications in the time and frequency domain. To this end, various control design techniques have been developed for FOS, some inspired by classical methods, some other based on new paradigms (machine learning, parameter optimization algorithms, neural networks, etc.), some other suited to the specific case of dynamic models represented by FOS (for example, complex-order fractional systems). In general, fractional order control has been proven to improve integer-order control because of its inherent robustness and the compact representation of the controller or the system to be controlled as a fractional order system.

The objective of this Open Invited Track is to offer the possibility to researchers to present their latest developments related to the stability and control of FOS, as well as those related to fractional order controllers, with applications to various fields.

Key dates:

31st December 2023 - Paper submission deadline

30 February 2024 - Notification of acceptance

22 April 2024 - Final paper submission deadline