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Open Invited Track on
Interval estimation applied to diagnosis and control of
uncertain systems

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Abstract: This open invited track has a goal to bring together and to present the last innovative results for design methods of set-membership and interval estimation, with their applications to robust control and Fault Detection and Isolation (FDI) of complex uncertain systems.

IFAC technical committee for evaluation: TC1.1 (optionally TC 1.2, TC 2.3)

Detailed description:

The estimation problem of unmeasured state and parameters for complex systems is of great importance for applications of the control theory. Emerging fields of applications require reliable approaches on estimation design for diverse classes of dynamical systems. In many areas, as in biology, for example, the intrinsic uncertainty of the models prevents for applications of the conventional estimation approaches. To overcome this obstruction, new techniques for estimation of uncertain systems have been proposed and developed. Uncertainty can be represented by unknown inputs/disturbances, noises, parameters or resulting from a transformation of nonlinear systems using Linear Parameter-Varying tools, where strong nonlinearities are modelled by uncertain parameters.

In some cases an exact estimation of the state is not possible due to a lack of information about uncertainties. In such cases, set-membership techniques can be used to provide not only an approximation but also the set of all admissible values of the state/parameters, which is consistent

with current measurements of inputs and outputs of the system.

This invited track aims at presenting the last innovative results for design methods of set-membership estimation and their applications to robust control and FDI of complex systems. A second objective of this invited track is to bring together the researchers working on robust estimation using interval or set-membership approaches in order to enrich the ideas exchanging and to stimulate discussions on the subject. It is expected that organization of such an open invited track will attract new researchers into the growing interval estimation community.

This open invited track is devoted to all topics related with interval estimation and its applications, including (but not limited to) the following subjects:

- Interval observer design
 - continuous-time, discrete-time, sampled systems
 - linear, nonlinear, time-varying, time delay, PDE models
- Set-membership estimators
- Output dynamic control using interval observers
- FDI using interval tools
- Applications of interval estimation techniques