



Open Invited Track

Fractional order differentiation in Modeling, System Identification and Observation

Organizers:

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Abstract: This open invited track is dedicated to the recent developments on fractional systems in the field of modeling, system identification and observation, both on theoretical and application aspects.

IFAC technical committee for evaluation: TC 1.1

Open Invited Track identification code: ucv3d

Detailed description:

Fractional (or non-integer) differentiation has played a very important role in various fields notably in signal and image processing and control theory. In these last fields, important considerations such as modeling, system identification and observability are now linked to long-range dependence phenomena. It is expected that such an open invited track will attract new researchers regarding the growing research and developments on fractional calculus in the areas of mathematics, physics, engineering and particularly in automatic control.

This invited session is devoted to research topics in the field of fractional calculus in order to present and to discuss the latest results in fractional dynamical systems and signals domain:

- Signal analysis and filtering with fractional tools (restoration, reconstruction, analysis of fractal noises)
- Fractional modeling especially of (but not limited to) thermal systems, electrical systems (motors, transformers, skin effect, etc.), dielectric materials, electrochemical systems (batteries, ultracapacitors, fuel cells, etc.), mechanical systems (vibration insulation, viscoelastic materials, etc.), biological systems (muscles, lungs, etc.)
- Fractional system identification (linear, nonlinear, multivariable methods, etc.)
- Implementation aspects (fractional controllers and filters implementation, etc.)
- Systems analysis (stability, observability, controllability, etc.)
- Observer synthesis, etc.
- Applications (mechatronics, automotive, medical/biological systems,...)

Key dates:

30 November 2026 – Open invited Paper [submission](#) deadline

15 February 2027 – Notification of acceptance

30 April 2027 Final paper [submission](#) deadline