

21st World Congress of the International Federation of Automatic Control  
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## Open Invited Track

### Fractional order differentiation in modeling and control

#### Organizers:

**Stéphane VICTOR**  
IMS – UMR 5218 CNRS  
University of Bordeaux  
[stephane.victor@ims-bordeaux.fr](mailto:stephane.victor@ims-bordeaux.fr)

**Pierre MELCHIOR**  
IMS – UMR 5218 CNRS  
Bordeaux INP/Enseirb-Matmeca  
[pierre.melchior@ims-bordeaux.fr](mailto:pierre.melchior@ims-bordeaux.fr)

**Abstract:** This invited session is dedicated to the recent developments on fractional systems in the field of system analysis, modeling, observation and control, both on theoretical and application aspects.

**IFAC technical committee for evaluation:** TC 2.2

**Invited session identification code:** 24y81

#### 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, stability, controllability, observability and robustness are now linked to long-range dependence phenomena. It is expected that such an invited session 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.)
- Control (Fractional PID, CRONE,  $H^\infty$ , etc.)
- Diagnosis of fractional systems
- Fractal structures, porous materials, etc.
- Applications (mechatronics, automotive, medical/biological systems,...)

#### Key dates:

**31 October 2019** - Paper **submission** deadline

**28 February 2020** - Notification to authors

**31 March 2020** - Final paper **submission** deadline