

3<sup>rd</sup> IFAC Conference on Embedded Systems, Computational Intelligence  
and Telematics in Control (CESCIT 2018)

4-6 June 2018

<http://www.cescit2018.org>

**Open Invited Track on:**

**Recent advances in fault diagnosis and fault tolerant control of  
polytopic systems**

**Organizers:** Dalil Ichalal (University of Evry, University Paris-Saclay, France),  
Horst Schulte (University of Applied Sciences, Berlin, Germany).

**Abstract:**

The aim of this invited track is to present recent theoretical developments and applications in the field of fault diagnosis and fault tolerant control based on dynamical polytopic models. This type of models include Linear Parameter Varying (LPV), quasi-LPV, Takagi-Sugeno (TS), Switched Systems, which can represent a large class of nonlinear behaviours, this is more realistic than linear models which represent the nonlinear behaviours only locally around an operating point. The polytopic models offer a halfway between nonlinear and linear models that allows to formulate the design problem by Linear matrix inequalities (LMIs) and can be efficiently *solved with convex optimization tools*.

The polytopic systems have been employed, in the field of fault diagnosis and fault tolerant control, to deal with a wide range of nonlinear control systems such as continuous-time, discrete-time, hybrid, sampled-data, time-delay, etc. However, several problems remain open and will be subjected to some improvements and new ideas in the field of observers, unknown input observers, fault detection and estimation, fault tolerant control and so on, using the polytopic models, which are the focus of this invited track.

## **IFAC technical committee(s) for evaluation: TC 6.4: Fault Detection, Supervision & Safety of Technical Processes**

### **Detailed description:**

The main topics of this special session include, but are not limited to:

- Polytopic systems (Takagi-Sugeno, LPV, Switched...)
- Observer design
- Unknown Input Observer
- Sliding-Mode Observer
- Fault detection/Isolation/Estimation
- Fault diagnosis
- Robust fault detection and isolation
- Fault tolerant control
- Filtering