On Fault Diagnosis of Clean Energy Systems.

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The objective of this workshop is to bring together researchers, engineers, students interested in Fault Diagnosis both for linear and nonlinear systems applied to clean systems (renewable energy (PV, Wind, Fuel cell) and Electric transportation, clean Diesel or Ignition engines, etc…).

When failures occur, it is crucial that they are detected and diagnosed promptly so that corrective action can be taken to reconfigure the control system and accommodate the change. . An early Fault Detection and Isolation (FDI) and an effective fault diagnosis play a key role. While the complexity of technical systems rapidly increases and the trends show a high integration of different types of subsystems and various technologies in technical processes, the research of FDI technologies in the last decade is marked by the development of techniques and tools, which solve FDI problems for a certain type of systems such as green energy models and are usually developed based on some technology or on the integration of different technologies and schemes to a low degree.

This workshop provides opportunities for researchers and developers to present their recent developments in control and diagnosis of renewable energy systems such: Solar system, Wind turbine system, Fuel cell, biomass, etc.. . Thus, this workshop aims to focus on the recent research and trends for the development and application of new methods for diagnosis of clean energy systems. How to elaborate an FDI algorithm based on models or no, How to detect and locate the faults in early stage, what are the limits and the complementarities of each method, such are the questions we want our participants learn after this workshop.

9h: 12h: Model based Fault diagnosis approaches

- Linear case
  - General principle of model based FDI approaches
  - Structural analysis, nonlinear observability analysis
  - Parity space approach
  - Observer-based approach
- Nonlinear case
  - Linearization (Taylor, Takagi-Sugeno, mean models, …)
  - Elimination theory, nonlinear parity space
  - Nonlinear observer
  - Applications to nonlinear systems through some European Project (SCODECE 05-025-FR (Bio-Diesel engine), i_MOCCA (fuel cell embedded system), INTRADE (electric transportation)) and regional project UNEOLE (Wind).

14h: 16h – Laboratory exercises using Matlab-Simulink

- DC motor, AC Motor
- Combustion Engine motor
- Renewable energy Systems (Fuel Cells, Wind, PV, etc…)

16h: 17h

- Round table
- Feedback of participants
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Documentation: CD-Rom including the lecture and the exercises
Level required: Master, Engineer, Master, PhD