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ICAIRES2022 SPECIAL SESSION
"Online Supervision of Renewable Energy Platforms"

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Session Co-Chairs:

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Abstract

Nowadays, renewable energy sources, such as solar and wind energy, are seen as emerging and sustainable solutions able to tackle the dependence on fossil fuels and mitigate greenhouse emissions. However, such energy sources are highly intermittent and the availability of the energy cannot be guaranteed all the time. For this reason, it is common that excess energy from these Renewable Energy Systems (RES), during off-peak hours, is stored in order to avoid energy waste and minimize operating costs. In addition, the emergence of the concept of micro-grids and smart multisource platforms, which combine RES, batteries fuel cells and electrolysers for short and long term storage, has raised the need for process safety and energy availability under a wide variety of operating conditions. In order to predict failures that may appear on RES systems and, if possible to avoid them in order to ensure their reliability, it is necessary to control and monitor the RES systems in real operating conditions. In fact, control, monitoring and diagnosis are the main features for end users. Furthermore monitoring and supervision systems reduce maintenance costs, provide failure prevention, and provide information on system operation and performance. But the complexity in real application due to accuracy, nonlinearity of dynamic model, presence of noises and difficulty to collect faulty modes need a development of smart supervisory and efficient fault detection and diagnosis algorithms to deal with these new trends of integrating RES in energy production scheme.

This invited special session deals with real (or pilot) innovative industrial applications of online supervision and fault detection and diagnosis algorithms of RES platforms (solar, wind, green hydrogen, electrolyser, Fuel cells…). The goal is to exchange the industrial and fundamental latest technological developments in this area.

The topics of interest include, but are not limited to:

- Online monitoring and supervision of RES
- Fault detection and diagnosis of RES in real operating conditions
- Artificial intelligence applied to supervision of RES
- Online optimal control and efficiency tracking of RES
- Online Data driven and model-based PHM (Prognosis and Health Management)
- Industrial or laboratory applications of supervision (FDI, FTC) systems

Short biography.

 Belkacem OULD BOUAMAMA is full Professor of automatic control, and head of international relations and research at Polytech Lille, Graduate School of Engineering within University of Lille (France). He is the leader of research PERSI group at the CRIStAL laboratory of the National Center for Scientific Research in Lille, where his research activities concern *Integrated Design for Supervision of System Engineering based on multiphysics Bond graph modelling.* Their industrial applications are mainly process engineering, renewable energies, and mechatronic systems. He made over 180 scholarly contributions including nearly 65 peer-reviewed papers in this domain, and co-author of nearly 20 books and book chapters in Diagnosis, bond graph modeling of mechatronic systems. He has given than 15 invited talks.

Professor Aissa Chouder received the Ingénieur and Magister in Electronics degrees from Ferhat Abbas University, Sétif, Algeria, in 1991 and 1999,respectively, and the Ph.D. degree in electronic engineering from the Universitat Politècnica de Catalunya (UPC), Barcelona, Spain, in 2010. He is currently full Professor with the electrical engineering department, University Mohamed Boudiar M'sila, Algeria and head of the Eletrcial Engeneering Laboratory (LGE). He has co-authored more than 100 papers in international journals and conference proceedings. His research interests include power electronics modeling, fault detection and diagnosis in photovoltaic systems, control of renewable energy systems and DC/AC converters in microgrids architecture.