

6 December, 14h-16h

Amphi Atrium, ESPRIT Building, Campus “Cité Scientifique”, University of Lille

“Control of a DFIG based Variable Wind Generator for a more efficient energy
conversion and sustainable power production”

Fayssal AMRANE
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Abstract:

In this talk Fayssal AMRANE will discuss the design and real time implementation of a wind power control for a Doubly Fed Induction WIND Generator in order to control independently the output stator real and reactive powers respectively. For this machine technology, several interests appear in the energy conversion but also constraints appear in the modeling and practice such as: the non-linearity of the entire wind power conversion system, the abrupt wind speed variations, the parametric variation and dynamic response in transient and steady states during two specific operating modes (Sub and Super-synchronous modes). To overcome such limitations, a simplified model in an orthogonal rotating frame is developed and used to design a Direct Power Control in order to master independently real and reactive powers. Regulation of inner power flows with a back to back power electronic converter structure will be discussed. Moreover, the generator speed variation allows a bidirectional power flow. In consequence, only +/-30% of the generator rated power is transmitted by the power electronic structure reducing losses. Fayssal AMRANE will focus on the stand-alone application (using RL-Three-phase balanced Load), in order to improve the power quality which will be injected to the load/or the grid; an experimental comparative study will be presented using three passive Filters (L, LC, and LCL) which are placed in rotor side converter.

About the Speaker

Fayssal AMRANE received his PhD degrees in electrical engineering from Ferhat ABBAS Setif-1 University, Algeria, in 2018. After that, he worked in the industry for some months. He published over 20 publications (journal articles, conference papers, and chapters in Book). He participated in a national research project known “*PRFU 2019-2023: Projets de Recherche et de Formation Universitaires*” which based on sustainable development applications, supported by the Algerian government. Currently he is an associate professor and a member of the LAS laboratory University at Setif-1 University. He developed and designed a dynamic control technique of electrical machine drive, also the control implementation of a high wind power generator (MW) onto a reduced scale benchmark (kW) in order to improve the performances of the wind power system regardless of variations and external disturbances.

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Fayssal AMRANE specific research interests are in the areas of:

-Wind energy conversion systems (WRCSs), Doubly fed induction generator (DFIG) and its controls, nonlinear control, Space vector modulation (SVM), Multi-levels converter, Matrix converter (MC), Power quality and Application of the Artificial intelligence (Type-1 fuzzy logic control, Type-2 fuzzy logic control and Neuro-fuzzy control) in the Renewable Energies.