Conference

«Integrated design of mechatronic systems : Software, diagnosis and control”

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Abstract: Bond graph is a powerful tool well known for dynamic modelling of multiphysical systems: This is the only modelling technique to generate automatically state space or non-linear models using dedicated software tools (CAMP-G, 20-Sim, Symbols, Dymola ...). Recently several fundamental theories have been developed for using a bond graph model not only for modeling but also as a real integrated tool for control, and Prognosis and Health Management (PHM) of mechatronics systems.

After presentation of my research group, this conference presents a synthesis of those new theories which exploit some particular properties (such as causal, structural and behavioral) of this graphical methodology. Based on a pedagogical and real applications, it will be shown how from a physical system (not a transfer function or state equation) and using only one representation (Bond graph), the following results can be performed: **modeling (formal state equations generation), Control analysis (observability, controllability), robust diagnosis analysis (automatic generation of robust fault indicators based on LFT Bond graphs) and prognosis. The presentation will be illustrated by pedagogical and real industrial applications.**

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Biography: Belkacem OULD BOUAMAMA is full Professor and head of the research at « Ecole Polytechnique de Lille, France ». His main research areas developed at CRIStAL laboratory CNRS9189 where he leads "MOCIS" group, concern Integrated Design for Supervision of System Engineering. Their application domains are mainly nuclear, energy, and mechatronic systems. He is the author of more than one hundred international publications in this domain. He is co-author of five books in bond graph modeling and Fault Detection and Isolation area. Research and teaching activities can be consulted at: https://wikis.univ-lille1.fr/ci2s/membres/belkacem-ould-bouamama