

Plenary Lecture:

Piezoelectric Materials, Structures and Systems: from Theory to Innovation

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Abstract:

During the last few decades, the modelling, simulation and experimentation of piezoelectric materials, structures and systems have been the focus of intense fundamental and technological researches for noise, shape, vibration and health control applications. This Plenary Lecture represents few success stories from the authors' more than two decades of research & innovation activities in this field. It focuses on some representative examples that goes from theory (fundamental) to innovation (applied). The resulting prototypes' system performance and structural material properties characterization are conducted theoretically (analytically and numerically) and experimentally in sensing, actuation and blocking force configurations. Main illustrative examples are a piezoelectric valve-less micro-pump and a new shear macro-fibre composite (MFC) patch; due its thinness, the latter posed numerous practical (experimental) and fundamental (numerical) challenges.

Short-bio:

Dr. Ayech BENJEDDOU is a University Professor (exceptional class). He is a Teacher at SUPMECA and Researcher at ROBERVAL Mixed Research Unit of SU/UTC and CNRS. His teaching interests are in *Composite Structures, Intelligent Materials & Adaptive Structures, Structural Vibrations & Controls*, and *Finite Element Methods*. He has a more than twenty years research experience in modelling, simulation and testing of *Piezoelectric Materials, Structures & Systems*. Dr. Benjeddou has published more than 200 journal and conference articles, editorials and book chapters. He is an independent scientific expert for the European commission and several European, North American and African universities and agencies. He is currently associate editor of *Int. J. of Smart & Nano Materials*, advisory board member of *ActaMechanica* and *Structural Control & Health Monitoring*, Contributing board member of *Mechanics of Advanced Materials & Structures*, and editorial board member of *Smart Structures & Systems*, and *Computers, Materials & Continua*. He edited 14 issues for these journals. He also reviewed for more than 70 scientific journals. Dr. Benjeddou gave around 30 plenary, keynote and invited conference lectures and organized more than 20 conferences and mini-symposia. He is currently co-chairman of the joint 8th *ECCOMAS Thematic Conf. on Smart Structures & Materials (SMART)* and 6th *Int. Conf. on Smart Materials & Nanotechnology in Engineering (SMN)*, Madrid (Spain), 5-8 June 2017, and 7th *Int. Symp. on Aircraft Materials (ACMA)*, Compiègne (France), April 2018. He is also a Leader of the *Smart Structures Track* within the *Multifunctional & Smart Composites* theme of the 21st *Int. Conf. on Composite Materials (ICCM)*, Xi'an (China), August 20-25, 2017.