

Special issue on Design, monitoring and control for smarter structures and systems

Preface

Modern offshore petroleum, aerospace, aeronautic, mechanical, civil and biomedical *smart structures and systems* (SSS) use active (or smart) materials for sensing, actuation, and transduction in order to add, wirelessly (through radio frequency transmission) and autonomously (through energy harvesting), new functionalities for active noise (acoustic), shape (morphing) and vibration control and health monitoring. The word ‘smart’ is sometimes understood in a wider sense so that it is rather meant for non-classical designs and concepts. Such miss-use is tolerated in some smart materials, structures and systems research meetings; this was the case for example at the joint 8th ECCOMAS Thematic Conference on *Smart Structures and Materials* (SMART) and 6th International Conference on *Smart Materials and Nano Technology in Engineering* (SMN), held in Madrid (Spain) from 5 to 8 June 2017 (Güemes *et al.* 2017), on which is based the present SSS journal special issue (SI). Following an open call to all registered participants (190) of the joint 8th SMART and 6th SMN, 13 manuscripts were spontaneously submitted to the present SSS SI. After the journal standard review process, that requires at least two positive independent reviewers’ reports, 6 revised submissions were successful, leading to a rate of rejection of around 54%. The retained papers are hereafter briefly described.

The first paper (Zawidzki and Jankowski 2018) was presented in ‘GS01: *Design, development and application of smart materials and structures*’; it reports on the internal topology and size optimization of module beams for a single branch truss-Z 3D frame structure. The second one (Jiménez-Alonso and Sáez 2018), presented in ‘MS03: *Identification, control and structural health monitoring of civil structures*’, proposes a motion-based design optimization method of a tuned mass damper for controlling the pedestrian-induced vibrations of footbridges under uncertainty conditions. The third contribution (Ginsberg *et al.* 2018), presented in ‘MS02: *Structural health monitoring*’, presents a time domain damage detection, location and extent framework that combines sparse solutions techniques with an extended Kalman filter. The fourth paper (Mieloszyk *et al.* 2018), also presented in GS01, investigates experimentally the THz spectroscopy for detecting, localizing and sizing (shape) of a water drop intrusion embedded in glass fibre reinforced polymer between two fibre optic sensors during the composite manufacturing process. Also presented in GS01, the fifth paper (Niu *et al.* 2018) analyses numerically (using a commercial finite element code) and experimentally the sensitivity of piezoelectric transducers arrays to inspection guided waves in a metallic pipe. The last (sixth) paper (Wang *et al.* 2018), presented in ‘MS05: *Multifunctional structures with integrated piezoelectric elements*’, discusses the shape control of large deformable mirrors for adaptive optics in the dynamic range; it focuses on the control-structure interaction-induced instability issues and related robustness tests and stability margin bounds as well as passive or active damping augmentation strategies.

Although half of the above described 6 papers does not use smart materials, we hope that this issue, focused on *design, monitoring and control for smarter structures and systems*, provides few ‘true’ representative ‘samples’ from the 220 contributions presented at SMART2017 and SMN2017, brings new knowledge and ideas to the latter respective research communities, and contributes to open minds and widen research interests of SSS readers. As a closure, we are thankful to the authors for their interesting contributions and to the reviewers for their sound reports. Besides, we would like to thank sincerely the editor-in-chief, Prof. Fabio Casciati, for his great help in managing this special issue, particularly for making the interface with the journal online edition system, the publisher and, partially, with the authors and reviewers.

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