IEEE/ASME International Conference on Advanced Intelligent Mechatronics (AIM 2018)

Invited Session on

Modeling, optimization and control of piezo-vibroacoustic system

Noises and vibrations are generated by a wide array of natural or man-made sources. The study of noises and vibrations and the interactions between them is now fast becoming an integral part of mechanical engineering science. Developing advanced structures with good vibration damping and noise insulation capability, or active/passive control methods is the traditional approaches to deal with these undesirable vibrations. With the development of materials, intelligent materials and structures that can actively suppress or even utilize vibrations and noises are emerging enabling technologies. Piezoelectric materials are often considered in this regard due to its bidirectional piezoelectric effect and wide-bandwidth response. Recently, Acoustic Black Hole (ABH) structures combined with smart materials such as piezoelectric transducers provide unique opportunities for structure-borne wave manipulation and can achieve high efficiency for vibration control. In addition, piezoelectric metamaterial / metastructure designs have also been attracting increasing research interests for passive or active band gap control. However, until now there are few successful applications due to the complicated characteristics of piezoelectric coupling of structures and electronic driving/harvesting circuits. Investigation of theoretical mechanism for the above piezoelectric structures will have significant scientific value for advancing the state-of-the-art vibration and noise control engineering. Therefore, this special session mainly deals with the latest advances and outcomes in modeling, optimization and control in piezoelectric-vibroacoustic systems, and aims to provide a platform for discussion of the latest results in this cutting-edge research area.

Potential topics include but are not limited to the following:

- Modeling and optimization of piezo-vibroacoustic system
- Piezoelectric circuitry for vibration control and noise suppression
- Piezoelectric vibration energy harvesting
- Adaptive piezoelectric metamaterials for band gap control and wave guiding
- Acoustic Black Hole (ABH) structures for energy focalization

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