MID-FREQUENCY VIBRATION MODELING: HYBRID FE/SEA THEORY AND ITS TWO APPLICATION ISSUES

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Abstract

In general, mid-frequencies refer to the frequency ranges where system vibrations are composed of both long- and short-wavelength deformations. In the past decades extensive research efforts have been putting on solving the mid-frequency vibration problems with large quantities of publications generated. Among these currently available mid-frequency modeling techniques, the hybrid FE/SEA theory developed by R. Langley and P. Shorter has been one of the most outstanding, by which low-frequency finite element (FE) and high-frequency statistical energy analysis (SEA) are able to be combined together for fast models at mid-frequencies. However, the hybrid theory requires the FE subsystems to be deterministic and the SEA subsystems with sufficient randomness. It thus may cause some difficulties in applying the hybrid theory to solve the practical engineering problems, e.g. when one or a few of subsystems are either un-deterministic or with insufficient randomness. The present research concerns how to deal with the parameter uncertainty of the FE subsystem and the insufficient randomness of SEA subsystems during the hybrid FE/SEA modeling.

Academic CV

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Dr. Ji joined the School of Mechanical Engineering, Shandong University as Associate Professor in Structural Dynamics in 2008. She obtained her Master Degree in Engineering from Shandong University of Technology in 1999 and then D.Phil. from Southampton University, UK in 2003. She was then research fellow at the Institute of Sound and Vibration Research (ISVR) for 4 years. Her research interests in the pass 15 years have been very much focused on the theoretical, numerical and experimental modeling methods for higher frequency structural vibrations, in particular, the so-called 'mid-frequency' range in which the system vibrates in forms of both long- and short-wavelength deformations.