A Method of Weighted Mean for Structural Random Loading Identification

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Multi-input-multi-output stationary random loading identification has been long a difficult problem for its poor identification precision caused by ill-condition problem of transfer function matrix inversion. In this paper, the inverse pseudo-excitation method is used for identification problems. Condition number weighted average method is developed to improve the accuracy of loading identification. A threshold value is introduced to reduce the computation cost. Simulations are given to prove the optimizations of the method. Experiments are designed to certify the feasibility of the algorithm and achieve good results. The condition number of FRF is introduced to choose the response measuring point in the experiment, so that it can reduces the workload and improves the identification precision.

Keywords: Condition number, Loading identification, Inverse pseudo-excitation method, Identification experiment, Random vibration, Method of weighted mean.