

Enhancing Transfer Path Analysis with In-Situ Component Transfer Path Analysis for Interface Forces Identification

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Abstract : The analysis of how vibrations are transmitted between components is required in many engineering applications. Transfer path analysis (TPA) has been a valuable engineering tool for solving Noise, Vibration, and Harshness (NVH) problems using sub-structuring applications. The most challenging part of a TPA analysis is estimating the equivalent forces at the contact points between the active and the passive side. Component TPA in situ Method calculates these forces by inverting the frequency response functions (FRFs) measured at the passive subsystem, relating the motion at indicator points to forces at the interface. However, matrix inversion could pose problems due to the ill-conditioning of the matrices leading to inaccurate results. This paper establishes a TPA model for an academic system consisting of two plates linked by four springs. A numerical study has been performed to improve the interface forces identification. Several parameters are studied and discussed, such as the singular value rejection and the number and position of indicator points chosen and used in the inversion matrix.

Keywords : transfer path analysis, matrix inverse method, indicator points, SVD decomposition

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