Energy Virtual Source Method for High-Frequency Vibration of Polygonal Plates: A Postprint

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Abstract

The purpose of this study is to introduce the virtual source method from room acoustics into the energy radiation transfer model for polygonal plates under high-frequency transverse point excitation, aiming to predict the energy response of structural bending vibrations. The core challenge lies in constructing the virtual source cloud field for polygonal plates. Within this model framework, structural boundaries are replaced by mirror virtual sources of the real source to represent continuous energy reflection at the boundaries. Based on kernel functions for energy density and power flow intensity in the direct field, the energy at any point within the structure can be obtained through superposition of energy generated by the real source and that produced by infinitely many mirror sources. Solutions for right triangular and square plates were obtained, revealing their energy density and power flow intensity distribution characteristics. Numerical example results, compared with those from the energy radiation transfer method and analytical solutions, verify the model's accuracy. Finally, the effects of damping, frequency, and virtual source order on computational convergence are discussed.

Full Text

Preamble

[The original text contains severe encoding corruption and cannot be meaningfully translated.]

Note: Figure translations are in progress. See original paper for figures.