Statistical Energy Acoustic for high Frequencies Analysis

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ABSTRACT.
For high frequency analysis, Statistical energy analysis (SEA) has proved to be a promising approach to the calculation of sound transmission in complex structures. In automotive industry and also in civil engineering, most of noise transmission is due to high-frequency structural vibrations, where the characteristic wavelength is small compared to the dimensions of the structure. For these applications classical methods of structural analysis, such as the finite element method (FEM), and Boundary Elements Method (BEM), cannot be used due to the large number of degrees of freedom required to model structural deformation. Statistical Energy Analysis (SEA) considers the vibrations of the structure in terms of elastic waves which propagate through the structure and are partially reflected and partially transmitted at structural connections. For the last few year there has been an increase in the application of SEA techniques to study noise transmission in motor vehicles.
In this paper simple examples are presented with SEA method, including a simplified vehicle model. The vehicle body is modeled as a collection of connected flat plates and cavities for predictive purposes. Each plate supports bending waves, longitudinal and transverse shear in-plane waves and assumed damping effects. The effects of curved plates and the transmission of waves through curves plates and beams are not included in the analysis. Numerical results in term of acoustic pressure inside the cavity, are in good agreement compared to analysis using other software and published in the literature.