World Academy of Science, Engineering and Technology
International Journal of Aerospace and Mechanical Engineering
Vol:17, No:08, 2023

A Statistical Energy Analysis Model of an Automobile for the Prediction of the Internal Sound Pressure Level

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Abstract : Interior noise in vehicles is an essential factor affecting occupant comfort. Over recent decades, much work has been done to develop simulation tools for vehicle NVH. At the medium high-frequency range, the statistical energy analysis method (SEA) shows significant effectiveness in predicting noise and vibration responses of mechanical systems. In this paper, the evaluation of the sound pressure level (SPL) inside an automobile cabin has been performed numerically using the statistical energy analysis (SEA) method. A test car cabin was performed using a monopole source as a sound source. The decay rate method was employed to obtain the damping loss factor (DLF) of each subsystem of the developed SEA model. These parameters were then used to predict the sound pressure level in the interior cabin. The results show satisfactory agreement with the directly measured SPL. The developed SEA vehicle model can be used in early design phases and allows the engineer to identify sources contributing to the total noise and transmission paths.

Keywords : SEA, SPL, DLF, NVH
Conference Title : ICASV 2023 : International Conference on Acoustics, Sound and Vibration
Conference Location : Tokyo, Japan
Conference Dates : August 17-18, 2023