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Structure-borne modeling of a vehicle in the mid-frequency range using Virtual SEA: experimental validation

Denis Thenail[a], Julien Baratier[b], Arnaud Duval[b], Gérard Borello[c] and Laurent Gagliardini[a]
[a]PSA Peugeot Citroën, Route de Gisy, 78943 Vélizy-Villacoublay Cedex, France
[b]Faurecia AST, Center of Acoustic Technology, Dämmstoffwerk 100, 38524 Sassenburg, Germany
[c]InterAC, 10 impasse Borde-Basse, ZA. La Violette, 31240 L'Union, France

Virtual SEA is a modeling process using FE computations to build an SEA model including equivalent masses, modal densities, and CLF, but excluding DLF since damping modeling in the mid-high frequency range is still an open issue. This technique -previously proposed by some of the authors- is applied to a production vehicle in the range 200-1000 Hz. The actual vehicle is simultaneously measured at a subset of the FE nodes. The automated sub-structuring provided by Virtual SEA (20 sub-systems at 630Hz) is used to favorably position 64 sensors on the body. Next, an experimental SEA procedure is performed: a full transfer matrix is measured between more than 1000 excitation (hammer) locations and the sensors. In order to compensate for structural heterogeneity, input mobilities are measured at every point and used to normalize the transfer matrix As all measurement points are associated to FE nodes, computed input mobilities can be compared to measurements. Finally, the SEA model identification is carried out for both experimental and virtual SEA. As far as damping (DLF) can only be known experimentally, comparisons of the numerical and experimental approach only concern the orher SEA parameters (CLFs, modal densities ...) and transfer functions.