Identifiant de la contribution : **306** Type : **non spécifié**

”JJCAB2#4 - Stochastic assessment of electric powertrain whining noise under early-stage design uncertainties”

lundi 10 juillet 2023 10:25 (5)

Despite the advantage of being quieter than traditional internal combustion engine vehicles, electric vehicles are often distinguished by high-frequency tonal components, which can be perceived as unpleasant to the occupants. To ensure optimal acoustic comfort in electric vehicles, it is important to analyze the NVH behavior of e-powertrains during the early stages of the design process which poses inherent uncertainties, such as varying operating conditions, partial knowledge of design parameters, dispersion in measurement data, etc. To effectively address these uncertainties, it is necessary to use fast and comprehensive stochastic models during the design phase.

In this work, a probabilistic framework is presented to estimate the electric powertrain’s interior whining noises considering the structure-borne contribution. Hence, two different stochastic metamodels are developed for efficient quantification and propagation of uncertainties from electric motor stage to powertrain mounting system. Multivariate Bayesian regression models help to incorporate prior knowledge on the uncertain parameters and generate the respective posterior distributions using Markov chains Monte Carlo (MCMC) techniques. The data is generated through weakly-coupled multi-physical domains estimated using semi-analytical approaches and combined with measured vehicle transfer functions. Importantly, the validation of each domain is conducted separately to ensure accurate representation. The results obtained from the developed probabilistic framework will aid in the early design stages by guiding engineers in making informed decisions to optimize NVH performance.

Presenter(s) : VINAY PRAKASH

Classification par session : JJCAB2