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Parameterization Scheme in a Large Automotive NVH Model for Statistical Validation

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Abstract

For a statistical validation of a full car model, selection of random variable is very difficult because of large number of candidate model parameters of the full car model: i.e., typically several thousands of model parameters. In this paper, a systematic approach in selecting crucial model parameters for the model validation and updating is proposed using the analysis of variance and experts' knowledge. First, the proposed approach reduces huge amount of model parameters into manageable number of model parameters using experts' knowledge. The listed candidate model parameters are categorized into aleatory or epistemic uncertainties according to available information. Using the orthogonal array, the analysis of variance with respect to the candidate model parameters is carried out for a response of interest in frequency domain. Each level of the orthogonal array for the candidate model parameters is allocated according to the type of uncertainty. The F-values in the analysis of variance which is the ratio of variance between the parameters to that within the parameters are normalized in order to determine the priority of the candidate model parameters in frequency domain. This procedure is demonstrated through a full car finite element model.