

A Comparative Study on Sampling Techniques of Polynomial Regression Model Based Stochastic Free Vibration of Composite Plates

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Abstract : This paper presents an exhaustive comparative investigation on sampling techniques of polynomial regression model based stochastic natural frequency of composite plates. Both individual and combined variations of input parameters are considered to map the computational time and accuracy of each modelling techniques. The finite element formulation of composites is capable to deal with both correlated and uncorrelated random input variables such as fibre parameters and material properties. The results obtained by Polynomial regression (PR) using different sampling techniques are compared. Depending on the suitability of sampling techniques such as 2k Factorial designs, Central composite design, A-Optimal design, I-Optimal, D-Optimal, Taguchi's orthogonal array design, Box-Behnken design, Latin hypercube sampling, sobol sequence are illustrated. Statistical analysis of the first three natural frequencies is presented to compare the results and its performance.

Keywords : composite plate, natural frequency, polynomial regression model, sampling technique, uncertainty quantification

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