

Robust Design with Variability Response Functions

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Key Words: *Dynamic Variability Response Functions; Stochastic finite element analysis; Robust Design Optimization; stochastic systems; Multi Objective Genetic Algorithm.*

In this work a different Robust Design Optimization is proposed implementing the established concept of Dynamic Variability Response Function for general FE systems. A bi-objective function formulation is considered for a frame structure involving stochastic field material properties variability and deterministic constraints of maximum stress and displacement response. For the two objective functions, the total structural weight and the maximum value of the Variability Response Function derived from a so called Fast Monte Carlo simulation procedure, a Pareto front is produced through multi-objective Genetic Algorithm optimization. The resulting outcome is by definition independent of the probability distribution and the spectral density used to model the material properties stochastic field thus leading to more global optima with respect to uncertain system parameters compared to standard Robust Design formulation.