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# RESPONSE VARIABILITY OF COMPOSITE STRUCTURES WITH RANDOM SPATIALLY VARYING MATERIAL PROPERTIES

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The accurate quantification of the random spatial variation of material properties at different scales is crucial for the application of the stochastic finite element method [1]. A Bayesian framework for determining the spatial variability of the apparent material properties of two-phase composites has been presented in [2]. Bayesian analysis allowed including uncertainty in the parameters of the respective mesoscale random fields. The information from computer-simulated images was utilized to define the likelihood function of the random field parameters given the homogenized microscale data. The uncertainty in the parameter estimates was quantified through sampling from their posterior distribution. Moreover, it was shown that the exponential correlation model is the most plausible among different correlation models belonging to the Matérn family through computing their respective posterior probabilities. The above results are used in this paper to generate sample functions of the mesoscale random fields using a generator based on covariance decomposition [3] and to compute the response variability of composite structures, such as a plate in plane stress and a cantilever in bending. Parametric investigations are conducted and useful conclusions are derived regarding the effect of the identified parameter uncertainty on structural response variability.

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