## Statistical Reconstruction of Multiphase Random Media

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Multi-phase random media such as rocks, concrete, alloy and composite materials are ubiquitous in the natural environment and engineering. The responses of multi-phase random media subjected to force, thermal or other type of loading are often of great interest to engineers and researchers, and such responses should be analyzed in the sense of statistics due to the inherent heterogeneity. The main focus of this work is on the reconstruction of multiphase heterogeneous materials with random morphology, based on statistical characteristics derived from a few measured samples. A highly efficient method has been developed for reconstructing multiphase composite materials with random morphology. It can be used for Monte Carlo simulations which require rapid reconstruction of large amounts of samples according to statistical characteristics derived from a few measured samples (reference samples). The new method is based on nonlinear transformation of Gaussian random fields. The explicitly reconstructed media are able to meet the discrete-valued marginal probability distribution function and the two point correlation function of the reference media.

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