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Computing macroscopic mechanical properties of heterogeneous composites

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Abstract

Generalized Hashin-Shtrikman variational principle with di_erent order of statistics is used to compute a rigorous approximation on the macroscopic e_ective elastic moduli for composite materials with di_erent internal structures. For this purpose, the statisti- cal and morphological features of the material are directly extracted from simulated or tomographic images and applied to the model. An interesting application with Liquid Crystal Elastomer (LCE) network composites will be introduced by coupling the model with piezoelectricity.