

MAR07-2006-001827

Abstract for an Invited Paper
for the MAR07 Meeting of
the American Physical Society

Nonaffine deformations in random solid media

BRIAN DIDONNA, University of California, Los Angeles

The elastic properties of materials which are inhomogeneous on mesoscopic length scales is a subject of broad interest in soft matter physics. Example systems include stiff polymer or biopolymer gels, foams, emulsions, grain packs, and microstructured solids. These diverse systems share the common feature that their linear elastic response is highly non-uniform, or “non-affine” at intermediate length-scales. I will present a general theoretical framework for interpreting the non-affine component of the linear elastic response of inhomogeneous materials. I will outline the connection between measured correlation functions and internal quantities such as correlation lengths, internal stress fields, and the degree of local elastic heterogeneity. I will show that the simplest 2-point correlation function gives misleading results in 2 dimensions, and I will propose better functions to measure.