Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Enhancement of mechanical properties in multiscale hierarchical materials: when do we need them? CATALIN PICU, ZHI LI, Rensselaer Polytechnic Institute, MONICA SOARE, General Electric Research and Development, STEFAN SOROHAN, DAN CONSTANTINESCU, Polytechnic University of Bucharest — In this work we study numerically the macroscopic behavior of composites with hierarchical stochastic microstructures in order to determine under what conditions spatial correlations of microstructural features become important. Spatial correlations are used to define internal length scales or to eliminate them altogether (fractal structures). The behavior is compared with that of uncorrelated random microstructures. We show that as the range of spatial correlations increases, gains are observed in most macroscopic properties. Significant improvements are observed in the damping behavior. These results are important for the mesoscale design of nanocomposites and other multiscale engineered materials and structures.

Catalin Picu
Rensselaer Polytechnic Institute

Date submitted: 15 Nov 2013 Electronic form version 1.4