Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Long-range correlations and solution of boundary value problems for semi-flexible polymer networks CATALIN PICU, HAMED HATAMI-MARBINI, Rensselaer Polytechnic Institute — Semi-flexible random fiber networks are present in biological and non-biological systems such as the cytoskeleton, tissue scaffolds and cellulose structures. In this work we show that long-range correlations exist in structural (e.g. density) and mechanical (e.g. elastic moduli) parameters of the network. All these quantities have large fluctuations with position and the magnitude of the fluctuations exhibits power law scaling. This observation makes solving boundary value problems defined over domains containing such networks difficult. The use of standard homogenization arguments becomes problematic. We present an inexpensive technique based on the stochastic finite element method that can be used for solving boundary value problems over such networks.

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Date submitted: 19 Nov 2009 Electronic form version 1.4