Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Poisson's ratio and microrheology of composite elastic materials with rigid rods. MOUMITA DAS, F.C. MACKINTOSH, Vrije Universiteit — We study both the macroscopic and micro-mechanical response of composites of rods embedded in elastic media. We calculate the response functions, and bulk elastic constants as functions of rod density. We find two fixed points for Poisson's ratio in 3D composites: there is an unstable fixed point for Poisson's ratio=1/2 (an incompressible system) and a stable fixed point for Poisson's ratio=1/4 (a compressible system). This stable fixed point is found to be robust with respect to rod density and extensibility. At high concentration, we recover the results for affine rod networks. These results may help to explain recent experiments [Physical Review Letters 102, 188303 (2009)] that reported compressibility for composites of microtubules and F-actin networks.

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Date submitted: 16 Nov 2009 Electronic form version 1.4