

Abstract Submitted
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Scaling behavior of the non-affine deformation of random fiber networks HAMED HATAMI-MARBINI, CATALIN PICU, Rensselaer Polytechnic Institute — Random fiber networks exhibit non-affine deformation on multiple scales. This controls to a large extent their “homogenized” behavior on the macroscopic (system level) scale. It is currently believed that denser networks and networks in which the fibers have vanishing bending stiffness deform affinely. Here we show that these conclusions depend on the nature of the measure used to probe the non-affinity. If a strain based measure is used, it can be shown that all networks, irrespective of the axial or bending behavior of their fibers are non-affine. Furthermore, the non-affinity decreases with the observation scale, exhibiting a universal power law scaling. The behavior of dense and sparse networks is shown to be similar if a scale renormalization is applied.

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