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Scaling of entropic shear rigidity SWAGATAM MUKHOPADHYAY, XIANGJUN XING, PAUL GOLDBART, University of Illinois at Urbana-Champaign — The scaling of shear modulus near the gelation/vulcanization transition is explored heuristically and analytically [1]. It is found that in a dense melt the effective chains of the infinite cluster have sizes that scale*sub-linearly* with their contour length. Consequently, each chain contributes $k_{\rm B}T$ to the rigidity, which leads to a shear modulus exponent $d\nu$. In contrast, in phantom elastic networks the scaling is *linear* in the contour length, yielding an exponent identical to that of the random resistor network conductivity, as predicted by de Gennes. For non-dense systems, the exponent should cross over to $d\nu$ when the percolation correlation length is much larger than the density-fluctuation length. [1] X. Xing, S. Mukhopadhyay and P. M. Goldbart, Phys. Rev. Lett. 93, 225701 (2004).

Paul Goldbart
University of Illinois at Urbana-Champaign

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