Abstract Submitted
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Criticality and isostaticity in fiber networks[1] XIAOMING MAO, OLAF STENULL, TOM C. LUBENSKY, University of Pennsylvania, CHASE P. BROEDERSZ, FRED C. MACKINTOSH, Vrije Universiteit — We investigated the elastic response of model semiflexible networks based on diluted periodic lattices, using a new effective medium theory and numerical simulations. In this model, central forces link nearest neighbor sites and bending forces link second neighbor sites along fibers. We found that by turning on fiber bending rigidity, the central force rigidity critical point became unstable, and the lattices lose rigidity at a lower threshold that is independent of fiber bending rigidity. We calculated scaling relations and exponents at both critical points. In addition to the bending and stretching dominated regimes, we identified a novel bend-stretch coupled regime in the vicinity of the central force critical point, in which the shear modulus exhibits a fractional power-law dependence on both the fiber bending and stretching rigidities.

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