Abstract Submitted
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Spatially localized structure-function relations in the elastic properties of sheared articular cartilage JESSE SILVERBERG, Department of Physics, Cornell University, LAWRENCE BONASSAR, Department of Biomedical Engineering and Sibley School of Mechanical and Aerospace Engineering, Cornell University, ITAI COHEN, Department of Physics, Cornell University — Contemporary developments in therapeutic tissue engineering have been enabled by basic research efforts in the field of biomechanics. Further integration of technology in medicine requires a deeper understanding of the mechanical properties of soft biological materials and the structural origins of their response under extreme stresses and strains. Drawing on the science generated by the "Extreme Mechanics" community, we present experimental results on the mechanical properties of articular cartilage, a hierarchically structured soft biomaterial found in the joints of mammalian long bones. Measurements of the spatially localized structure and mechanical properties will be compared with theoretical descriptions based on networks of deformed rods, poro-visco-elasticity, and standard continuum models. Discrepancies between experiment and theory will be highlighted, and suggestions for how models can be improved will be given.

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