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Modeling non-linear micromechanics of hydrogels using dissipative particle dynamics[1] SVETOSLAV NIKOLOV, ALBERTO FERNANDEZ-NIEVES, ALEXANDER ALEXEEV, Georgia Institute of Technology — In response to an appropriate external stimulus microgels are capable of undergoing large and reversible changes in volume (10-20 times) which has made them attractive as microscopic actuators and drug delivery agents. However, the mechanics of microgels is not well understood in part due to inhomogeneities within the network. Full-scale atomistic modeling of micrometer-sized gel networks is currently not possible due to the large length and time scales involved. We develop a mesoscale model based on dissipative particle dynamics to examine the mechanics of microgels in solvent. By varying the osmotic pressure of the gels we probe the changes in bulk modulus for different values of the Flory-Huggins parameter. We examine how the bulk modulus depends on inhomogeneities we introduce within the gel structure by altering the crosslink density and by embedding rigid nanoparticles.

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