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Scaling relations in shear flow near the jamming transition<sup>1</sup> BRIAN TIGHE, ERIK WOLDHUIS, Instituut-Lorentz, Universiteit Leiden, JORIS REMMERS, Computational Solid Mechanics, TU Eindhoven, MARTIN VAN HECKE, Kamerlingh Onnes Laboratory, Universiteit Leiden, WIM VAN SAAR-LOOS, Instituut-Lorentz, Universiteit Leiden — We present a simple model for the rheology of dense systems of viscous soft repulsive disks, which are themselves an idealized model for foams and other disordered soft matter systems that undergo a jamming transition. The model predicts rational-valued scaling exponents and connects macroscopic stresses and microscopic velocity fluctuations. We predict three scaling regimes in the rheology. Exponents depend non-trivially on the form of the viscous interaction between bubbles, while the width of each regime is set by the distance to the critical packing fraction associated with jamming. The model makes specific predictions for rheology near the jamming transition, which we test with numerical simulations.

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Brian Tighe Instituut-Lorentz, Universiteit Leiden

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