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Rheology of Minimally Jammed Frictionless Rodpiles[1] JAMES GRAHAM, SCOTT FRANKLIN, Rochester Institute of Technology — The ability of large aspect ratio granular particles to form solid plugs is now well-documented but, apart from a general phenomenological explanation of geometric entanglement, remains unexplained. Recent experiments on the collapse of granular columns [1] suggest that rods with even moderate aspect ratios can maintain angles of repose of 90° or larger, implying that the shear modulus increases continuously with aspect ratio. Our simulations generate minimally jammed packings of frictionless, aspect ratio 1-48 spherocylinders through an energy-minimization process. Once the minimally jammed state is reached, we continue the process to larger packing fractions in order to determine the bulk modulus. Packings are then subjected to infinitesimal strain in order to calculate the shear modulus as a function of particle aspect ratio. Shear simulations can be extended to large strain and used to investigate the long-time reordering of rod-like particles that accompanies macroscopic shear.

[1] M. Trepanier and S. V. Franklin, Phys. Rev. E **82**, 011308 (2010).

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