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Shear of ordinary and elongated granular mixtures[1] ALEXANDER HENSLEY, MATTHEW KERN, Rochester Institute of Technology, THEODORE MARSCHALL, STEPHEN TEITEL, University of Rochester, SCOTT FRANKLIN, Rochester Institute of Technology — We present an experimental and computational study of a mixture of discs and moderate aspect-ratio ellipses under two-dimensional annular planar Couette shear. Experimental particles are cut from acrylic sheet, are essentially incompressible, and constrained in the thin gap between two concentric cylinders. The annular radius of curvature is much larger than the particles, and so the experiment is quasi-2d and allows for arbitrarily large pure-shear strains. Synchronized video cameras and software identify all particles and track them as they move from the field of view of one camera to another. We are particularly interested in the global and local properties as the mixture ratio of discs to ellipses varies. Global quantities include average shear rate and distribution of particle species as functions of height, while locally we investigate the orientation of the ellipses and non-affine events that can be characterized as shear transformational zones or possess a quadrupole signature observed previously in systems of purely circular particles. Discrete Element Method simulations on mixtures of circles and spherocylinders extend the study to the dynamics of the force network and energy dissipated as the system evolves.

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