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Bagnold and linear scalings in shearing simulations of massive particles[1] DANIEL VÅGBERG, PETER OLSSON, Umeå University, Sweden, S. TEITEL, Dept. of Physics and Astronomy, University of Rochester, NY — We consider the rheology of massive bidisperse soft-core discs in two dimensions driven by a constant shear rate $\dot{\gamma}$ at zero temperature. We study how the behavior depends on the details of the dynamics, by investigating three different models for the energy dissipation. In these models the dissipation from two colliding particles are proportional to (1) the total velocity difference, (2) the normal component of the velocity difference, (3) the tangential component of the velocity difference, respectively. It turns out that these seemingly minor differences have major implications for the scaling of the pressure p with respect to $\dot{\gamma}$. The system can exhibit linear scaling, $p \sim \dot{\gamma}$, or Bagnold scaling, $p \sim \dot{\gamma}^2$, depending on the details of the dissipation used. It is found that the onset of linear scaling is related to the appearance of force chains spanning the system.

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