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Characterizing local forces and rearrangements inside a gravity-driven granular flow EMMA THACKRAY, KERSTIN NORDSTROM, Mount Holyoke College — While the gravity-driven flow of a granular material in a silo geometry can be modeled by the Beverloo equation, the mesoscale-level particle rearrangements and interactions that drive this flow are not well-understood. We have constructed a quasi-two-dimensional system of bidisperse, millimeter-scale disks with photoelastic properties that make force networks within the material visible. The system is contained in an acrylic box with an adjustable bottom opening. We can approach the clogging transition by adjusting this opening and by adding external forcing to the top of the flowing pile. By placing the system between cross-polarizers, we can obtain high-speed video of this system during flow, and extract intensity signals that can be used to identify and quantify localized, otherwise indeterminate forces. We can simultaneously track individual particle motions, which can be used to identify shear transformation zones in the system. We are therefore able to correlate local forces with rearrangements within the system, and characterize the evolution of this interplay on the approach to the clogging transition.

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