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Segregating photoelastic particles in free-surface granular flows. AMALIA THOMAS, NATHALIE VRIEND, DAMTP, University of Cambridge, ENVIRONMENTAL AND INDUSTRIAL FLUID DYNAMICS TEAM — We present results from a novel experimental set-up creating 2D avalanches of photoelastic discs. Two distinct hoppers supply either monodisperse or bidisperse particles at adjustable flow-rates into a 2 meter long, narrow acrylic chute inclined at 20. For 20–40 seconds the avalanche maintains a steady-state that accelerates and thins downstream. The chute basal roughness is variable, allowing for different flow profiles. Using a set of polarizers and a high-speed camera, we visualize and quantify the forces due to dynamic interactions between the discs using photoelastic theory. Velocity and density profiles are derived from particle tracking at different distances from the discharge point and are coarse-grained to obtain continuous fields. With the access to both force information and dynamical properties via particle-tracking, we can experimentally validate existing mu(I) and non-local rheologies. As an extension, we probe the effect of granular segregation in bimodal mixtures by using the two separate inflow hoppers. We derive the state of segregation along the avalanche channel and measure the segregation velocities of each species. This provides insight in, and a unique validation of, the fundamental physical processes that drive segregation in avalanching geometries.

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