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Breaking Size-Segregation Waves in Granular Avalanches KASPER VAN DER VAART, Environmental Hydraulics Laboratory, École Polytechnique Fédérale de Lausanne, Écublens, Lausanne, C.G. JOHNSON, School of Mathematics and School of Earth Sciences, University of Bristol, Bristol, UK, P. GAJJAR, J.M.N.T. GRAY, School of Mathematics and Manchester Centre for Nonlinear Dynamics, University of Manchester, Manchester, UK, C. ANCEY, Environmental Hydraulics Laboratory, École Polytechnique Fédérale de Lausanne, Écublens, Lausanne — We experimentally prove the existence of the theoretically predicted breaking size-segregation wave within a binary granular avalanche. This complex structure involves the recirculation of particles through a pattern of shocks and rarefaction waves, and causes large particles to accumulate at the avalanche front and small particles in the tail. Using the non-intrusive imaging technique of refractiveindex matching we study particle-size segregation inside the flow—far from the sidewall—on an inclined moving-bed channel. In this configuration the bottom layers of the flow are dragged upslope while upper layers are avalanching downslope due to gravity; effectively, the flow remains stationary in the reference frame of the observer. This allows us to time-average discrete particle positions in the steadystate flow and arrive at a continuous particle concentration. The measured particle concentration and particle trajectories match qualitatively with the theoretical predictions.

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