

Abstract Submitted
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Particle-size segregation of granular materials under shear
MICHAEL SHEARER, LINDSAY MAY, NICK GIFFEN, KAREN DANIELS,
North Carolina State University — Particle size segregation in avalanches occurs through shearing within the granular flow. In such a flow, large particles migrate upwards, their vacated spaces being filled by smaller particles. The Gray-Thornton continuum model is a scalar conservation law in two space variables and time, but with variable coefficients corresponding to the spatially dependent velocity in shear flow. Sharp interfaces separating different mixtures are shock wave solutions that typically form in finite time from smooth initial conditions. Shocks with more large particles below small are physically unstable, leading to time-dependent multidimensional patterns. An experiment in a Couette shear cell exhibits mixing and segregation predicted by theoretical solutions.

Michael Shearer
North Carolina State University

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