Meeting: 1003, Atlanta, Georgia, SS 27A, AMS-SIAM Special Session on Analysis and Applications in Nonlinear Partial Differential Equations, I

1003-35-771 **Michael Shearer*** (shearer@math.ncsu.edu), Department of Mathematics, NC State University, Raleigh, NC 27695. *Particle-size segregation and inverse-grading in granular avalanches.*

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. In a recent paper, Gray and Thornton proposed a simple model to capture this segregation, based on conservation of mass for two-phase flow, and basic mixture theory. The equation is a scalar conservation law in two space variables and time, but with variable coefficients corresponding to the spatially dependent velocity in shear flow. In this talk, I describe initial boundary value problems for this equation, and show numerical simulations. In simple circumstances, explicit multidimensional solutions are available. Interfaces with large particles below small are physically unstable, and this property can be explained mathematically as an unstable shock. Indeed, unstable interfaces provide the richest multidimensional structures, only some of which are explained theoretically. (Received September 29, 2004)