

Abstract Submitted
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Steady State Erosion of Granular Particles by Shear Flow¹ BENJAMIN ALLEN, ARSHAD KUDROLLI, Clark University — Despite decades of scientific observation of rivers, streams and laboratory experiments the process of erosion still is not understood. Empirical fits are used to determine when erosion starts with more than an order of magnitude scatter or a shifting power law determining how much material erodes away. In order to study the many body problem of multiple particles we first need to understand the basics of a single particle eroding from a potential well in laminar flow. Using different particle densities and different barrier heights we looked at the onset of erosion and the balance of forces and torques to create a predictive model of when a single particle will erode over a barrier of a given height as a function of shear rate and viscosity. We then create a steady state system in which to image erosion as it happens and simultaneously measure flow velocity and particle movement. Measuring particle movement allows us to determine when steady state erosion occurs and calculate the fluxes and slip velocities at the beginning of the erosion process as we transition from rolling particles to particles suspended in the fluid flow.

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