Abstract Submitted
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Velocity profiles and rheology of a granular bed sheared by a fluid flow[1] BENJAMIN ALLEN, ARSHAD KUDROLLI, Clark University — We discuss an experimental investigation of motion of a granular bed driven by a laminar fluid flow as a function of applied shear rate. This is a model system to investigate a variety of examples where such a situation arises including wind blowing over sand, sediment transport in rivers, slurries, and turbidity currents. We have developed an experimental apparatus which allows examination of the fluid as well as the grain dynamics both at the surface as well as deep into the bed under steady state conditions with refractive index matching technique. This allows us to obtain both the applied local shear stress by the fluid as well as the local strain rate inside the bed. We find that that the granular flux as a function of depth decays exponentially into the bed. Further, the velocity profile is observed to exhibit a crossover from a regime where particles are fully suspended to where there is bed load transport. We will discuss the observed velocity and density profiles in light of various models of granular suspensions.

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