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Simulations of secondary currents in rapid granular chute flow JOSEPH CALANTONI, Naval Research Lab, JUSTIN FINN, University of Liverpool, JULIAN SIMEONOV, SAMUEL BATEMAN, Naval Research Lab — The desire to understand granular flow as a fluid mechanical phenomena has long been the focus of theoreticians and experimentalists alike. Several analogies can be drawn with complex hydrodynamic behaviors at the continuum scale including Leidenfrost states, Rayleigh-Benard (R-B) convection, and Rayleigh-Taylor instability that allow for deeper understanding of collective granular motions. Here, we consider the case of longitudinal vortices in rapid granular flow down an inclined chute, and draw an analogy to hydraulic open channel flow. Previous experiments of rapid granular flow down inclined chutes have uncovered a unique regime where the flow exhibits stripes of slower and faster moving grains. We present results of molecular dynamics simulations that allowed us to study the full scale of the phenomena including smooth sidewalls and the rough bumpy bottom. We found that the secondary currents were intensified near the lateral walls.

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