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**Velocity fluctuations in granular mixtures in a rotating drum** JIAFENG ZHANG, TAM, University of Illinois, KIMBERLY HILL, SAFL, University of Minnesota — Dense free surface granular flow often has two regimes. In the lower region, particles slide over one another in dense, low-energy laminar-like flow. In the upper region, particles bounce and "saltate" over one another in an energetic, low-density cloud. We numerically study the magnitude of velocity fluctuations – often associated with a granular temperature – for mixtures of particles differing in size and density in these two regimes coexisting in a rotating drum. We found that differences in the velocity fluctuation between the different mixture components depend on the regime of the flowing layer. In the low-density energetic regime, the velocity fluctuations of a component relative to the mixture vary with mass: heavier particles have smaller velocity fluctuations than lighter particles in the same mixture, regardless of size difference. In the high-density, low-energy regime, the smaller particles always have larger velocity fluctuations than the larger particles. We show this difference is attributable to the regime of flow: where the volume fraction is relatively low near surface, collisions dominates the interactions between particles; below the low volume region, geometric constraints dominate the interactions between particles.

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