

Abstract Submitted
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Sorting out segregation mechanisms in densely flowing granular mixtures KIMBERLY HILL, YI FAN, University of Minnesota, JIAFENG ZHANG, University of Illinois — Densely flowing granular mixtures segregate due to differences in the size, material density, and other particle properties. In some situations the segregation is simple: smaller particles tend to sink compared to their larger equal-density counterparts; denser particles tend to sink compared with their equal-sized lighter counterparts. These are often attributed to kinetic sieving and buoyancy, respectively. However, in some situations the segregation is more complex: particles poured into a pile may segregate into stratified layers, and in drums some mixtures will segregate into radial stripes and axial bands. It is difficult to determine the dominant segregation mechanism(s) in each case. In most experimental segregation studies of densely sheared granular mixtures, velocity gradients, volume fraction gradients and gravity simultaneously act on the granular mixture. We compare segregation in three different systems to isolate each mechanism. While gravity is important, eliminating the volume fraction gradient significantly reduces size segregation. Shear-induced segregation is also important, but appears the weakest of the three mechanisms in dense granular flow.

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