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Radial striping in granular mixtures: a positive feedback mechanism Z. HUANG, J. ZHANG, V. MITTAL, K.M. HILL, Department of Theoretical and Applied Mechanics, University of Illinois, Urbana, IL — When mixtures of particles differing only in size (S-systems) or only in density (D-systems) are rotated in a circular drum, the components quickly un-mix, and a simple cylindrically symmetric segregation pattern forms. In D-systems the circularly symmetric segregation (‘moon’) pattern is stable for all drum fill levels. In contrast, in S-systems this simple segregation pattern will further evolve into a dramatic radial striping (‘sun’) pattern for drum fill levels near 50 percent. While the simple radial segregation pattern is considered well-understood, the mechanism driving the striped segregation pattern is not. In this talk we present experimental evidence that the growth of the stripes is driven by a positive feedback mechanism based on a concentration dependence of the velocity of the particles. This model is tested and supported using computational experiments using a continuum model based on these experimental observations.

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