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Mechanisms in size segregation of binary granular mixtures

STEPHAN ULRICH, University of Göttingen, JENNIFER KREFT, MATTHIAS SCHRÖTER, JACK SWIFT, HARRY SWINNEY, Center for Nonlinear Dynamics, University of Texas at Austin — Shaking of a mixture of large and small particles can lead to segregation. One distinguishes between the Brazil-nut effect (large particles go to the top) and its opposite, the reverse Brazil-nut effect. In this talk, experiments of vertically shaken binary mixtures are presented. Using image analysis, the number of large particles visible at the top and bottom of the granulate are counted to determine the state of segregation. By complementing these results with molecular dynamics simulations, we are able to identify different segregation mechanisms discussed in recent theoretical approaches: a geometrical mechanism called void filling, transport of particles in sidewall-driven convection rolls, and thermal diffusion, a mechanism predicted by kinetic theory.

Stephan Ulrich
University of Göttingen

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