



ME Department Seminar

Attractive Couples Break Up Unexpectedly



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Abstract

Objects with short-range, attractive forces – “sticky” particles – can form agglomerates when they are brought together slowly. Consider bringing a magnet into contact with a refrigerator: a gradual approach results in sticking, whereas a thrown magnet is likely to bounce off. In this work, we consider a system in which collections of sticky particles with low speeds are brought together. Surprisingly, the level of agglomeration is less than that observed with particles at larger distances and higher speeds. This unexpected behavior is traced to flow instabilities and gravity, which leads to higher-impact collisions. Such high-impact collisions ultimately lead to the breakup of the attractive couples (i.e., agglomerates). Applications of this work include the processing of biomass for renewable energy, medicinal powders for pharmaceutical manufacturing, and synthesis of specialty chemicals.

Bio

Christine Hrenya is a Professor of Chemical Engineering at the University of Colorado. Her interests lie in the field of multiphase and solids flows, using a combination of theory, simulation, and experiments. To date, this research program has resulted in 110 journal papers and 120 invited lectures, and \$13M in funding from the U. S. DOE, NSF, NASA, ACS and industry. She currently serves as the PI of a \$3.5M U.S. Department of Energy grant targeted at discrete-particle simulations for the energy industry, including exascale computation. Recent recognitions include the 2014 AIChE Lectureship Award in Fluidization and the 2013 University of Colorado Excellence in Teaching Award. Prof. Hrenya recently served as the Chair of the 2016 AIChE Annual Meeting, and has previously served as Chair of the 2006 Gordon Conference on Granular Flow (Oxford University) and as co-Director of a 2001-2004 GAANN program in Micro- and Nano-Particle Technology. She also serves as an Associate Editor for the AIChE Journal.