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Simulations of Shear Mixing of Bidisperse Cohesive Particles with a Large Size Range LEE AARONS, University of Florida — The mixing of granular materials is generally a difficult task. Differently sized particles will tend to segregate, and particles less than 100 microns in diameter tend to agglomerate due to cohesive forces exceeding the weight of a particle. The primary purpose of the present study is to examine the influence of particle cohesion on the homogeneity of mixtures of cohesive particles featuring a large range of particle sizes. As a model problem, we consider discrete element method simulations of bidisperse collections of cohesive particles with a diameter ratio of 7:1 undergoing shear flow as a means of mixing. Simulations were performed with and without gravity along with different particle cohesive strengths and shear rates. Without gravity, the small particles needed to be more cohesive than some threshold to result in significant clustering, in which case the best mixing was achieved when the big particles were equally as cohesive as the small ones. With gravity, continuous shearing caused the particles to first mix and then separate again. The homogeneity just before de-mixing started was found to generally improve with decreasing cohesion.

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