



Numerical Investigation of the Effects of Particle Density and Dimensionless Acceleration on Segregation in 2D Vertically Vibrated Binary Granular Mixtures

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Abstract. The present work aims at investigating the influences of particle density and dimensionless acceleration on segregation phenomena in 2D binary granular mixtures by using contact dynamics method. The granular samples were prepared by randomly depositing two species of regular pentagonal particles inside a rectangular container. These two particle species are the same in size, but differ in terms of particle density. Different levels of vertical vibration were then applied to the mixtures. The simulation results were systematically analyzed by using segregation coefficient (H), segregation pattern, and velocity field related to convection mechanism. It was found that segregation phenomena are not observed in this study. This could be explained by the fact that a value of friction coefficient between interparticle and that value between wall and particle are set to be the same, that is why no segregation was found in the present study. Due to the friction, only convection rolls were observed for all the density ratios when dimensionless acceleration is greater than 2.

Keywords: Granular materials, Segregation, Density, Discrete element method (DEM), Vibration