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Analysis of the Angle of Maximal Stability and Flow Regime Transitions in Different Proportions of Bi-phasic Granular Matter Mixtures JOEL TIU MAQUILING, SHANE MARIE VISAGA, Geophysics Research Laboratory, Department of Physics, School of Science Engineering, Ateneo de Manila University — This study investigates the dependence of the critical angle θc of stability on different mass ratios γ of layered bi-phasic granular matter mixtures and on the critical angle of its mono-disperse individual components. It also aims to investigate and explain regime transitions of granular matter flowing down a tilted rough inclined plane. Critical angles and flow regimes for a bi-phasic mixture of sago spheres and bi-phasic pepper mixture of fine powder and rough spheres were observed and measured using video analysis. The critical angles $\theta_{c\,MD}$ of mono-disperse granular matter and $\theta_{c\,BP}$ of biphasic granular matter mixtures were observed and compared. All types of flow regimes and a supramaximal critical angle of stability exist at mass ratio $\gamma = 0.5$ for all biphasic granular matter mixtures. The $\theta_{c\,BP}$ of sago spheres was higher than the $\theta_{c\,MD}$ of sago spheres. Moreover, the $\theta_{c\,BP}$ of the pepper mixture was in between the $\theta_{c\,MD}$ of fine pepper and $\theta_{c\,MD}$ of rough pepper spheres. Comparison of different granular material shows that $\theta_{c\,MD}$ is not simply a function of particle diameter but of particle roughness as well. Results point to a superposition mechanism of the critical angles of biphasic sphere mixtures.

Joel Tiu Maquiling
Geophysics Reserach Laboratory, Department of Physics, School of Science
Engineering, Ateneo de Manila University

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