Graduate Student Research Seminar

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Impact of solid spheres onto multilayer granular rafts

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Monday, January 26th
3:00 pm (EST) – 132 Fluor Daniel Building

Abstract

Projectile water entry is typically characterized by cavity formation and splashing. The presence of buoyant granular materials, seen across many scales from microplastics to ice mélange atop the ocean surface, can significantly alter this behavior. In our experimental study, we systematically investigate the impact of a solid sphere onto granular rafts comprised of buoyant particles, as it depends upon both the impactor and raft characteristics. For thick layers with low inertia impact, the impactor can become entrained in the granular layer or pass through leaving a stable cusp-like shape. For high inertia events, we observe the classical cavity regimes for a clean interface, in addition to a new granular cavity in which particles partially coat the cavity interface. We quantify pinch-off time and location for various types of cavities identified in our study. These findings are relevant to ocean-atmosphere interactions where momentum, energy and mass exchange through air entrainment in the ocean or aerosolization of sea salt and microparticles in the atmosphere.

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