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Exploration of Near Earth Asteroids (06)
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VISITING NEAR EARTH ASTEROIDS: GRANULAR PHYSICS ISSUES

Abstract

The microgravity of a near Earth asteroid or comet (generically a 'near-Earth object' or NEO) makes non-destructive interactions by either humans or robots problematic. Most NEOs are composed of fractured rock, sometimes highly fractured and porous, and because they are thought to be held together by their own gravity, rather than by chemical forces, they have come to be known as rubble-piles. The physics of granular materials (e.g. sand piles or grain silos) has been well-studied in Earth's gravity. We discuss how the granular physics of a rubble-pile NEO will affect such processes as anchoring to the surface or collecting and accelerating a sample. We describe series of studies, both lab- and space-based, which could enable strategies for dealing with these issues for both robotic and human missions to NEOs.