Abstract Submitted
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Acoustic Investigation of Buried Objects[1] WILLIAM GRISMORE[2], ELI OWENS[3], Presbyterian College Physics Department — Granular materials are ubiquitous. However, sound propagates through these materials in a nonlinear, poorly understood fashion. Acoustic waves may provide a non-invasive means of investigating granular materials. This project uses acoustic waves to investigate objects buried in a granular material composed of sand, with either a concrete or lead brick buried in the middle. Piezoelectric sensors are placed throughout the granular material; these output a voltage directly proportional to the sound amplitude. The frequency response of the system, with and without the buried object, is studied. We find that the lead and concrete interfaces suggest acoustic reflection, with the lead interface exhibiting more reflection than the concrete interface. We also found that at frequencies below approximately 2000 Hz the sand systems attenuates the acoustic waves better than the concrete or lead systems do, although this is not the case at frequencies higher than 2000 Hz. At these higher frequencies, sound penetrates lead less so than concrete, and concrete less so than sand alone. We find that the power spectrum qualitatively scales with the interface density at these higher frequencies, but does not scale with the interface modulus or sound speed.

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