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Multiple wave compression of poly-disperse granular materials using the Split-Hopkinson Pressure Bar DANYAL MAGNUS, LIAM SMITH, WILLIAM PROUD, Imperial College London — The compaction of poly-disperse granular materials under compression in a Split-Hopkinson Pressure Bar was investigated for multiple wave traversals through the specimen. Rough sand and fine soda-lime glass granular specimens were studied to provide a comparison between materials of differing strength and morphology. Both materials had a nominal average grain diameter of 0.5mm. By observing compression of the granular specimen for long-durations (up to 10ms), the global plastic response of the granular specimen was observed. After an initial compaction, the material behaviour was found to depend upon strength, achieving either a locked-up state for the glass spheres indicative of force equilibrium, or a "quasi-locked-up" state indicative of continued deformation/fracture. In the case of force equilibrium, this is associated with the formation of a force chain network. Hence, any assumption of force equilibrium may only apply after an initial rearrangement within the granular bed. The number of wave reflections before compaction was found to depend on volume fraction. Similarly, the macroscopic sound speed was observed to increase with time during compaction.

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