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Deformation and shock consolidation of various sands under explosive loading S.A. WECKERT, A.D. RESNYANSKY, Weapons and Combat Systems Division, DSTO, PO Box 1500, Edinburgh SA 5111, Australia — Transmission of a shock wave through various geological materials is important in military applications, for assessing the effects from a buried explosive device to an above-ground target. The composition of a real soil is complex and involves multiple constituents that undergo a number of physical and mechanical transformations during the shock loading. The present study analyzes several model soils represented by limestone sand, silica sand, and a small aggregate soil. The soils are compressed using two different steel encapsulation assemblies subject to explosive compression. These set-ups attempt to vary the level of applied load to the encapsulated soil and the length of the high-temperature effects. The assemblies are instrumented with embedded manganin gauges within the encapsulation casing for comparative analysis of the waves propagating through the soil and steel encapsulation. A comparative analysis of the recovered soil samples, including a microstructural analysis focusing on the grain breakage, soil compaction and consolidation, is correlated with a CTH numerical analysis employing a multi-phase rate sensitive material model.

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