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Modeling Dynamic Compaction of Porous Materials with the Overstress Approach YEHUDA PARTOM, Retired — To model compaction of a porous material (PM) we need 1) an equation of state (EOS) of the PM in terms of the EOS of its matrix, and 2) a compaction law. For the EOS it is common to use Herrmann's suggestion, as in his Pα model. For a compaction law it is common to use a quasi-static compaction relation obtained from 1) a mezzo-scale model (as in Carroll and Holt's spherical shell model), or from 2) quasi-static tests. Here we are interested in dynamic compaction, like in a planar impact test. In dynamic compaction, the state may change too fast for the state point to follow the quasi-static compaction curve. We therefore get an overstress situation. The state point moves out of the quasi-static compaction boundary, and only with time collapses back towards it at a certain rate. In this way the dynamic compaction event becomes rate dependent. In the paper we first write down the rate equations for dynamic compaction according to this overstress approach. We then implement these equations in a hydro-code, and run some examples. We show how the overstress rate parameter can be calibrated from tests.

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