Abstract Submitted
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Modeling gradual and rate dependent closing and opening of pores in porous materials YEHUDA PARTOM, RAFAEL — Most dynamic porous materials models assume that under shock loading pore closure is immediate. Such an approach is known as the snowplough model. But pore closing, as well as pore opening, is a relatively slow mechanical process that involves fracture, plastic flow and material motion. As a result, a shock loaded porous material may become overstressed relative to its quasistatic pore closing/opening curves. Being overstressed, the material state point tends to fall back onto the appropriate quasistatic curve at a rate that is an increasing function of the amount of overstress. In this way the pores opening/closing processes become rate dependent. Here we develop and outline such a rate dependent pore closing/opening model. The model includes: 1) an equation of state for porous materials based on Herrmann's assumptions [1]; 2) the quasistatic closing/opening curves; and 3) rate functions for the overstress decrease. We implemented our model in a hydrocode, and to demonstrate how the model works we show examples of some planar impact runs. W. Herrmann, J. Appl. Phys. 40, 2490-2499 (1969).

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