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Modeling Dynamic Rate Dependent Pore Closure with a Range of Pore Sizes YEHUDA PARTOM, Retired — Previously we presented a model (which we call PORT) for rate dependent pore closing/opening, for which we assumed that all pores close/open with the same dynamics. Here we upgrade PORT to take into account different dynamics as function of pore size. We represent different pore sizes by their volume (v), and we have k such pore sizes. We therefore call this model VK. For each pore size we have n_i (i=1,k) pores per unit mass. We're not aware of any concrete pore size distributions; we therefore assume that pore sizes are initially distributed with a log-normal distribution. Similar to PORT, we define quasistatic pore closure curves which depend on pore volume v, and we compute the rate of pore closure with a linear overstress relation relative to these curves. From the values of v and vdot (rate of change of v) we can then compute (for each computational cell, and for each time within a time step) the overall porosity ϕ, and its rate of change ϕdot. Finally we compute Pdot and Tdot (P=pressure and T=temperature) in the same way as in PORT, using the equation of state of the porous material. To show how our VK model works we apply it to a simple 1D problem. A 20GPa sustained pressure pulse enters a porous aluminum target. We show histories of pressure, temperature and porosity at several locations into the target. We compare these curves with the ones obtained for k=1 (as in PORT).

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