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The Shock Response of Granular and Consolidated Ta2O5[1]
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The dynamic behavior of granular and nearly fully dense tantalum pentoxide (Ta_2O_5) has been explored through planar impact experiments. The experiments span from the compaction regime to the ultra-high pressure range utilizing gas guns and the Z machine. These data provide a valuable data set for the extension of the P-λ model to the high-pressure regime. A thermodynamic approach due to Rice and Walsh is employed in the model to treat highly distended materials that can display anomalous compressibility. When the model is calibrated to the gas gun and Z data, we test its applicability against the data of Miller et al. from laser experiment on low-density aerogels. Even in these very different conditions, the model does a credible job of predicting the material behavior, suggesting that the approach may be useful as a general modeling tool for the high-pressure regime.

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