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Dynamic properties and behavior of 316L stainless steel ROBERT KING, ANNA LLOBET-MEGIAS, GUILLERMO TERRONES, SARYU JINDAL-FENSIN, RUSSELL OLSON, GEORGE GRAY III, CHRISTOPHER MORRIS, DEREK SCHMIDT, ALEXANDER SAUNDERS, AMY TAINTER, WENDY VOGAN-MCNEIL, Los Alamos National Laboratory — Understanding materials properties and the ability to accurately model and predict their behavior when implemented in large-scale hydrodynamic simulations, is essential to ensuring and assessing a wide range of industrial, engineering, and defense applications. This work provides insights into the accuracy of the strength models in the high pressure-high strain rate regime for 316L wrought austenite stainless steel through measurements of Rayleigh-Taylor (RT) instability. Experimental measurements using velocimetry and Proton Radiography (pRad) are used to test the accuracy of the current constitutive models using PAGOSA hydrodynamic simulations. Three commonly used strength models were com-pared with the data consisting of the time evolution of the peak-to-trough RT growth. Based solely on this metric, our results are in reasonable agreement with the data as long as the high explosive (HE) drive is modeled correctly. In addition, the data shows that the RT instability growth follows a simple power law behavior and that beyond the onset of instability, the growth rate progressively slows down as kh increases.

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