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Laser-driven spall experiments in ductile materials in order to characterize Johnson fracture model constants LAURENT VIDEAU, PATRICK COMBIS, EMILIEN LESCOUTE, JEAN-PAUL JADAUD, CEA-DAM-DIF, JEAN-MARC CHEVALIER, DIDIER RAFFESTIN, FABRICE DUCASSE, LOIC PATISSOU, ALAIN GEILLE, CEA-DAM-CESTA, THIBAUT DE RESSEGUIER, Institut Pprime-CNRS — We present laser-driven spall experiments on Al, Ta, Au and Steel by using the ALISE laser at CEA-CESTA. The free-surface velocity of 100-200μm targets was measured by using a VISAR diagnostic. A transverse shadowgraphy diagnostic was used to characterize the ejected matter distribution. The experimental results are compared with 1D-Lagrangian hydrodynamic simulations including the Johnson fracture model. For each material, we find new model constants which allow us to reproduce experiments over a range of laser fluence with and without spallation. In addition 2D hydrodynamic simulations are used to study the effect of the finite size of the focal spot. We finally present experimental and numerical results on thin targets (20μm) with laser energy below the spallation threshold. We study here the ductile target plastic deformation and fracture due to central laser-driven shocks.

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