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Ballistic properties of ejecta from a laser shock-loaded groove: smoothed particles hydrodynamics compared with experiments CAROLINE ROLAND, THIBAUT DE RESSEGUIER, Institut Pprime, CNRS-ENSMA-Univ. Poitiers, France, ARNAUD SOLLIER, EMILIEN LESCOUTE, CEA, DAM, DIF, 91297 Arpajon, France, DIOUWEL TANGIANG, MARC TOULMINET, Institut Pprime, CNRS-ENSMA-Univ. Poitiers, France, LAURENT SOULARD, CEA, DAM, DIF, 91297 Arpajon, France — The interaction of a shock wave with a rough free surface may lead to micrometric material ejection of high velocity (km/s-order). This microjetting phenomenon is a key issue for many applications, such as industrial safety, pyrotechnics or inertial confinement fusion experiments. We have studied this process from single V-shaped grooves of various angles in copper and tin samples shock-loaded by a high energy laser. Experimental details are presented elsewhere in this conference [T. de Rességuier, C. Roland et al., abstract #000154]. As the Smoothed Particles Hydrodynamics formulation is well-suited for the high strains involved in jet expansion and for subsequent fragmentation, this mesh-free method was chosen to simulate microjetting. Computed predictions are compared to experimental results including jet tip and planar surface velocities, spall fracture, and size distribution of the fragments inferred from both fast shadowgraphy and post-recovery observations. Special focus is made on the dependence of the ballistic properties (velocity and mass distributions) of the ejecta on numerical parameters such as the initial inter-particular distance, the smoothing length and a random noise introduced to simulate inner irregularities of the material.

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