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Picosecond radiography combined with other techniques to investigate microjetting from calibrated grooves in laser shock-loaded metals.
THIBAUT DE RESSEGUIER, CAROLINE ROLAND, Institut Pprime, CNRS-ENSMA-Univ. Poitiers, GABRIEL PRUDHOMME, CEA, DAM, DIF, ERIK BRAMBRINK, LULI, CNRS-CEA-Ecole Polytechnique-Univ. Paris VI, JEAN-ELOI FRANZKOWIAK, CEA, DAM, DIF, DIDIER LOISON, IPR, CNRS-Univ. Rennes 1, EMILIEN LESCOUTE, ARNAUD SOLLIER, CEA, DAM, DIF, LAURENT BERTHE, PIMM, CNRS-CNAM ParisTech — Debris ejection upon shock breakout at a rough surface is a key issue for many applications. For a few years, we have used laser driven shocks to study microjetting in metallic samples with calibrated grooves in their free surface. Fast transverse optical shadowgraphy, time-resolved measurements of both planar surface and jet tip velocities, and post-recovery analyses have provided data over ranges of small spatial and temporal scales, short loading pulses (ns-order) and extremely high strain rates. The new experiment presented here involves two laser beams in a pump-probe configuration. Picosecond laser irradiation of a thin copper wire generates x-rays which are used to radiograph the microjets expanding from single grooves in tin and copper samples shock-loaded by a longer, nanosecond laser pulse. Such ultrashort radiography can be used to infer the density gradients along the jets as well as inside the samples deep beneath the grooves. It is combined with the techniques mentioned above to provide a more complete insight into the physics of microjetting.

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