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Supersonic plasma jet interaction with gases and plasmas at the PALS laser facility PH. NICOLAI, C. STENZ, X. RIBEYRE, V. TIKHONCHUK, CELIA, University Bordeaux, France, A. KASPERCZUK, T. PISARCZYK, IPPLM, Warsaw, Poland, L. JUHA, E. KROUSKY, K. MASEK, M. PFEIFER, K. ROHLENA, J. SKALA, IP, Prague, Czech Rep., J. ULLSCHMIED, IPP, Prague, Czech Rep., M. KALAL, D. KLIR, J. KRAVARIK, P. KUBES, CTU, Prague, Czech Rep., P. PISARCZYK, WUT, Warsaw, Poland — The interaction of supersonic plasma jets with dense gases and plasmas has been studied experimentally and theoretically. Under suitable conditions on the laser intensity, spot radius and target atomic number, a radiative jet can be launched from a simple planar target with a 100 J laser pulse [Ph. Nicolai et al, Phys. Plasmas 13, 062701 (2006)]. A typical copper jet has a velocity around 500 km/s, a Mach number greater than 10, a density around 10^{18} cm^{-3}, a length of a few millimeters and a radius of 0.5 mm. The interaction of such a jet with Ar and He gas puffs at different pressures has been studied by using various optical and x-ray diagnostics. Qualitative estimates and numerical simulations with a 2D radiation hydrodynamic code allow to explain a sequence of physical processes during the interaction, which include the collision of two plasmas, shock propagation and radiation cooling. Variations in the atomic number and pressure of a target plasma allow us to control the role of radiative and kinetic processes in the jet evolution.

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