Abstract Submitted
for the SHOCK07 Meeting of
The American Physical Society

Damaging of materials by bi-dimensional dynamic effects M. BOUSTIE, J.P. CUQLELANDAIS, L. BERTHE, CNRS, S. BARRADAS, ENSMP, C. BOLIS, M. ARRIGONI, T. DE RESSEGUIER, CNRS, M. JEANDIN, ENSMP, LCD, FUTUROSCOPE TEAM, LALP, ARCUEIL TEAM, C2P MINES, EVRY TEAM — Laser shocks are most often used to produce uniaxial stress and strain into materials by irradiating a spot diameter conventionally admitted at least three times larger than the thickness of the shocked sample. By reducing the laser spot versus the sample thickness, 2D lateral waves are created earlier and their crossing during propagation stages generates traction which can yield to voids into materials (near the front loaded face). This phenomenon has been evidenced by an experimental study, including VISAR measurements which exhibit the signature of the fracture generated by these 2D effects. Numerical simulations with the explicit finite element code RADIOSS clearly evidence the origin of the 2D effects on VISAR measurements. This different mode of damaging materials by laser lateral waves can act simultaneously with the classical laser spallation produced by the uniaxial propagation (shock wave reverberation crossing the unloading). This opens new discussed prospects for the development of 2D damage models and for applications such as the debonding test of coatings on thick substrates by laser shock.

Michel Boustie
CNRS/ENSMA

Date submitted: 22 Feb 2007 Electronic form version 1.4