PPPS 2019



Contribution ID: 495

Type: Poster

4P19 - Effects of the electron beam parameters on hydrodynamic response of aluminum: measurements and simulations.

Thursday 27 June 2019 16:00 (1h 30m)

Effects of the electron beam parameters on hydrodynamic response of aluminum: measurements and simulations.

J. Gardelle, B. Bicrel, B. Cassany, A. Galtié, D. Hébert and N. Szalek.

CEA/CESTA, 15 avenue des Sablières, CS 60001, 33116, Le Barp, France

The study of the dynamical response of material under shocks produced by electrons requires a good knowledge of these when they interact with solid targets. The CESAR generator is used at CESTA to feed a field emission diode which delivers single-shot and very intense electron pulses (\approx 800 keV, \approx 300 kA, 60 ns). The electrons emitted by the cathode propagate in a gas-filled chamber where they are focused by a magnetic coil onto an aluminum target. The analysis of the beam characteristics at the target position gives the initial conditions required for precise hydrodynamics simulations. In this paper, we present the measurements of the main beam characteristics at the position where the target is installed. We paid particular attention to voltage, current, spatial homogeneity, dose rate onto the target, as well as Photon Doppler Velocimetry (PDV) of the target back face. The angles of incidence of the electrons are estimated by using the PIC code MAGIC with a strong approximation. Indeed, our simulations tools do not work in gases at 1 mbar and we are currently assuming perfect space charge and current neutralization. We are trying to address this issue by adapting the code CALDER developed at CEA/DIF and within a Basic Science collaboration with SNL. Nonetheless, we obtained very nice agreement between the measurement and the simulation of the shock, as computed by the CEA codes Diane and Hesione.

Authors: Mrs BICREL, Béatrice (CEA); Dr CASSANY, Bruno (CEA); Mr GALTIÉ, Alain (CEA); Dr GARDELLE, Jacques (CEA); Mr HÉBERT, David (CEA); Mr SZALEK, Nicolas (CEA)

Presenter: Dr GARDELLE, Jacques (CEA)

Session Classification: Poster - Charged Particle Beams and Accelerators and High Energy Density Plasmas and Applications

Track Classification: 3.2 Intense Electron and Ion Beams