



Contribution ID: 217

Type: Oral

ICE-16, A DEMONSTRATOR FOR AN UPGRADE OF GEPI DRIVER, TOWARDS ISENTROPIC COMPRESSION EXPERIMENTS AT 6 MA, 1 MICROSECOND LEVEL

Tuesday 20 June 2017 11:00 (15 minutes)

GEPI, developed in 2002 [1], has been the first compact pulsed power driver using strip line loads for isentropic compression experiments (ICE). Still in full operation, it delivers 3.5 MA with a 500 ns rise time and its main use is for ICE around or below GPa level, with load width less or equal to 70 mm. Because of its high availability, its reliability and ease of operation, this kind of compact driver is a key tool for dynamic material studies ongoing at CEA.

An upgrade of GEPI was decided last year, with two main goals. First goal is to maintain capabilities of ICE for long term (beyond 2020). Second goal is to improve these capabilities, mainly in terms of 1D time analysis of the response of thicker samples and in terms of sample shapes (plane or curved), for pressure levels equivalent to GEPI's. This upgrade, named GEPI-2, also includes a cost reduction objective. The idea for that is to reuse the Trench capacitors (4 μF -90 kV -10 nH) coming from SPHINX, which was a microsecond Z-pinch driver.

Based on these performances and cost criteria, GEPI-2 design studies lead to a 6MA - 1 microsecond rise time ICE driver. A demonstrator, named ICE-16, has been developed to test the main performances and collateral designs solutions leading to an optimized GEPI-2. Design, circuit and EM simulations and preliminary tests on ICE-16 are presented.

[1] P.-L. Hereil, F. Lassalle, G. Avrillaud, "GEPI : an ICE generator for dynamic material characterization and hypervelocity impact", Proceedings of the 2003 APS Conference SCCM, AIP Conf. Proceedings, 706, p. 1209-1212 (2004).

This work is supported by the DGA (Direction Générale de l'Armement)

Author: Mr LASSALLE, Francis (CEA Gramat)

Co-authors: Mr ZUCCHINI, Frederic (CEA Gramat); Mr MORELL, Alain (CEA Gramat); Mr GRUNENWALD, Julien (CEA Gramat); Mr LE BLANC, Gael (CEA Gramat); TOURY, Martial (CEA Gramat)

Presenter: TOURY, Martial (CEA Gramat)

Session Classification: Oral session 9 - Imploding Solid Liners, Equation of State (EOS) and Isentropic Compression Experiments (ICE) - Session Chair : Thomas Awe

Track Classification: High-Energy Density Physics and Technology