HIGH PULSED POWER AT CEA DAM

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Abstract

High Pulsed Power (HPP) system have been developed at CEA-DAM in France for the last 6 decades in order to assist with National Defence and Deterrence programmes in which they play a key role. HPP technologies are generally used as key subsystems of a more complex equipment such as large accelerators or laser facilities. This talk aims at giving an overview on the HPP technologies that are currently operational or being developed at CEA-DAM. The main achievements in five different fields of applications are reported according to both, a technology oriented approach and an historical perspective.

The first application that this talk covers deals with the contribution of HPP to the Lab-scale simulation of both radiative and non-radiative extreme environments. It presents the specifications, technologies and performances of HPP facilities developed at CEA in order to carry out a wide variety of experimental studies for technology design validation, for component selection or in order to assess the vulnerability of systems.

Then, this talk shows also how the design of pulsed power systems for the Laser MegaJoule (LMJ) facility were successfully managed at CEA DAM. This example illustrates how the optimisation of a large HPP system can rely on the right balance between borrowing from consumer power electronics and specific developments.

The main achievements in the High-Power Microwave (HPM) systems for defence electromagnetic applications are also presented. Among the different systems described, a focus is given on a compact and repetitive Marx generator development.

As the HPP expertise at CEA-DAM may also be oriented towards non-military applications in order to address key issues in various fields ranging from fundamental research to industry, few examples of recent achievements are shown to illustrate the potential of HPP for scientific and industrial applications.

At last, this talk presents the latest HPP development on flash X-ray radiography. The Teutates collaboration between the United Kingdom and France is introduced and the experimental facilities, EPURE in France and the Technology Development Centre (TDC) in the UK are presented through their main pulse power equipment that are the 20MeV Linear Induction Accelerator in operation as a 1st axis in EPURE and the 7.5MeV Inductive Voltage Adder currently commissioned in the TDC prior to being used as a 2nd axis in EPURE. The HPP work for the 3rd radiographic axis of the EPURE facility are highlighted as well.

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