PULSED POWER SUPPLIES FOR RADIATION GENERATORS

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Abstract

For more than a decade, the Plasma and Pulsed Power Research Group (P^3G) at Loughborough University has directed a substantial research effort towards the design, manufacture and testing of pulsed power supplies for various radiation generators relevant to non-lethal weaponry. As an example, a system based on an explosive-driven helical flux-compression generator was developed in the early 1990s, capable of producing more than 2 MJ and a load current exceeding 7 MA. Various output conditioning schemes were investigated, with the aim of producing MV voltage impulses with nanosecond rise times for EMP generators.

The expertise and experience that has been gained through more than 15 years of research in this area means that Loughborough is now one of the few centres capable of designing compact explosive driven power supplies for microwave generators, and a number of system designs have recently been supplied. These generators are usually housed in rockets or high-calibre ammunition and are intended to provide powerful radiation that is capable of disturbing or destroying electronic equipment at distances of between 50 and 100 m.

Most recently, high-power multi-pulse sources for producing three successive GW pulses simultaneously on two X-ray heads (or possibly microwave emitters) have been successfully demonstrated

The paper outlines both previous work and the main thrusts of the ongoing work at Loughborough. Particular attention is paid to the development of a 10 GW pulse for HPM generators and to the physics and technology underlying the novel and unconventional generation of microwaves.