

A Fast Pulsed Power Supply for Pulsed Electron Beam Applications

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ABSTRACT

At the Institute for Pulsed Power and Microwave Technology, KIT, surface treatment by pulsed electron beams is investigated for improving the surface properties of metals [1]. The Pulsed Electron Beam Device (GESA) used in this process features a multipoint explosive emission cathode with demanding requirements concerning the pulsed power supply, namely a fast voltage rise rate of 100 kV/100 ns [2] and high currents of up to 600 A. For increasing the reliability of the process, the GESA is currently being equipped with a modular semiconductor-based pulse power source [3]. The design of the power source allows for a step-wise arbitrary output waveform of up to 120 kV for a duration of 100 μ s. The required fast voltage rise time is achieved by using fast switches [4], fast optical signal transmission, a low inductance circuit layout, and minimizing the stray capacitances to ground. The dynamic load behaviour of GESA demands for a fast overcurrent protection scheme, which is implemented by distributing the control circuitry over the whole generator.

This contribution highlights selected features of the design and presents latest measurements.

References

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