

Abstract

High-power Electron Beam Diodes

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Intense high current high voltage electron beams ($\sim 1 - 10$ MV, $\sim 0.1 - 1$ MA, ~ 100 ns) are useful for a variety of defense applications, including simulating certain nuclear weapon effects, high-power x-ray radiography, detection of contraband fissile material, and high energy density science. An overview of fundamentals of how these electron beams are generated and their applications will be presented. Also discussed will be state-of-the-art diagnostics used to characterize them. The emphasis will be on experimental understanding and the use of numerical simulation to advance that understanding. Particular attention will be paid to demonstrated technologies that could include the large area diode, the ring diode, the planar and cylindrical reflex triodes, the self-magnetic pinch diode, the vacuum rod-pinch diode, and the plasma-filled rod-pinch diode, with a focus towards application metrics.