

Observations of a vacuum spark under different driver conditions of the applied voltage

H. Chuaqui, M. Favre, L. Soto, E. Wyndham

Abstract

Comparative observations of the Vacuum Spark discharge are presented under differing electrical drive conditions but identical geometrical conditions. A $1.5\ \Omega$ 120 nsec, coaxial line is used to provide maximum currents to 90 kA. The line may be operated in the usual switched mode to give a rectangular voltage and current wave form, or in the Hybrid mode, in which case the voltage builds slowly until breakdown occurs. In both modes of operation the value of dV/dt is about 1×10^{12} A/sec. A Nd:YAG is focused onto either electrode to initiate the discharge. With the laser focused onto the anode a low-density plasma accompanied by intense electron beams is formed. With the laser focused on the cathode a much higher plasma density is observed in the gap, with the formation of a dense tight pinch close to the cathode, in which hot spots form at peak current. The Hybrid mode is favored for its reproducible behavior.