

Abstract Submitted
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A Plasma Opening Switch Based on a Gas-Puff/Axial Wire Configuration¹ JOSEPH ENGELBRECHT, PHILIP DE GROUCHY, Cornell University, NICHOLAS OUART, Naval Research Laboratory, NIANSHENG QI, LEVON ATOYAN, JACOB BANASEK, WILLIAM POTTER, DAVID HAMMER, BRUCE KUSSE, Cornell University, JOHN GIULIANI, Naval Research Laboratory — We are investigating an idea for switching current from a gas-puff shell to an axial metal wire as a mechanism for generating inductive voltage spikes and x-rays above 10 keV. The outer annulus of a 7 cm. diameter triple-annular gas-puff nozzle is used to inject gas into the electrode gap of the COBRA 1 MA generator, with a single wire on-axis. We show that the current pulse produced by COBRA initially travels through the lower inductance pre-ionized outer shell plasma, generating an azimuthal magnetic field which drives this shell radially inwards. Rayleigh-Taylor instability growth occurs on the outer edge of this imploding plasma, which disrupts the current carrying column, inhibiting the axial flow of current through the gas-puff plasma and possibly causing the current to switch to the higher inductance wire. A disruption to the current through the gas-puff shell caused by instability growth should be measurable as a voltage spike, as the current finds a new path either through the wire or elsewhere in the imploding plasma shell. We investigate this effect as instability conditions are varied, by adjusting the density and species of the injected gas.

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