Abstract Submitted
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Instability studies in radial foil configurations on the COBRA generator[1] P.-A. GOURDAIN, J.B. GREENLY, D.A. HAMMER, P.F. KNAPP, B.R. KUSSE, S.A. PIKUZ, P.C. SCHRAFEL, T.C. SHELKOVENKO, Cornell University — Radial foil configurations prove to be a very simple experimental set up to study high energy density plasmas. A 5-micron thin metallic foil lies flat over a stretcher which is connected to the anode of a pulsed power generator such as COBRA (1MA, 100 ns current rise time). The cathode contacts the foil at its geometrical center using a hollow stainless steel pin. As the foil ablates, JxB forces lift the foil leading to the formation a plasma bubble surrounding a central plasma column, which is a z-pinch. Force densities on this column should increase considerably as the initial pin diameter is diminished and we expect plasma properties to change accordingly. Based only on pin diameter considerations, radial foil explosions could produce magnetic pressures ranging from 160 kbar (for 2-mm pins) to 2.5 Mbar (for 0.5-mm pins). However, as the cathode diameter diminishes, instabilities appear earlier in the discharge, preventing the z-pinch implosion to occur at maximum current, de facto limiting plasma parameters. We investigate the cause of these instabilities, the possible means to reduce plasma instabilities and to improve plasma performances.

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