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Investigation of MHD Instabilities in Jets and Bubbles Using a Compact Coaxial Plasma Gun in a Background Magnetized Plasma Y. ZHANG, D.M. FISHER, B. WALLACE, M. GILMORE, University of New Mexico, S.C. HSU, Los Alamos National Laboratory — A compact coaxial plasma gun is employed for experimental investigation of launching plasma into a lower density background magnetized plasma. Experiments are being conducted in the linear device HelCat at UNM. Four distinct operational regimes with qualitatively different dynamics are identified by fast CCD camera images. For regime I plasma jet formation, a global helical magnetic configuration is determined by a B-dot probe array data. Also the m=1 kink instability is observed and verified. Furthermore, when the jet is propagating into background magnetic field, a longer length and lifetime jet is formed. Axial shear flow caused by the background magnetic tension force contributes to the increased stability of the jet body. In regime II, a spheromak-like plasma bubble formation is identified when the gun plasma is injected into vacuum. In contrast, when the bubble propagates into a background magnetic field, the closed magnetic field configuration does not hold anymore and a lateral side, Reilgh-Taylor instability develops. Detailed experimental data and analysis will be presented for these cases.

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