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Coronal plasma development in wire-array z-pinches made of twisted-pairs C.L. HOYT, J.B. GREENLY, P.A. GOURDAIN, P.F. KNAPP, S.A. PIKUZ, T.A. SHELKOVENKO, D.A. HAMMER, B.R. KUSSE, Cornell University — We have investigated coronal and core plasma development in wire array z-pinches in which single fine wires are replaced by twisted-pairs ("cable") on the 1 MA, 100 ns rise time COBRA pulsed power generator. X-ray radiography, employed to investigate dense wire core expansion, showed periodic axial nonuniformity and evidence for shock waves developing where the individual wire plasmas collide. Laser shadowgraphy images indicated that the axial instability properties of the coronal plasma are substantially modified from ordinary wire arrays. Cable mass per unit length, material and the twist wavelength were varied in order to study their effects upon the instability wavelength. Implosion uniformity and bright-spot formation, as well as magnetic topology evolution, have also been investigated using self-emission imaging, x-ray diagnostics and small B-dot probes, respectively. Results from the cable-array z-pinches will be compared with results from ordinary wire-array z-pinches. This research was supported by the SSAA program of the National Nuclear Security Administration under DOE Cooperative agreement DE-FC03-02NA00057.

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