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Inductively driven transmission lines: fringe-field-driven devices for powering diagnostic X-ray sources on the Z Pulsed Power Facility¹ C. E. MYERS, M. R. GOMEZ, B. T. HUTSEL, P. F. KNAPP, M. KOSSOW, D. C. LAMPPA, L. M. LUCERO, C. A. JENNINGS, D. A. YAGER-ELORRIAGA, Sandia National Laboratories, H. HASSON, University of Rochester — Pulsed-power-driven diagnostic X-ray sources such as X-pinchs have long been fielded in series with the load on 1-MA pulsed power facilities. However, the substantially larger load currents and more stringent inductance constraints at the Z Pulsed Power Facility have thus far prevented the fielding of diagnostic X-pinchs on Z experiments. Here we introduce the inductively driven transmission line (IDTL) concept, whereby a secondary transmission line is inductively coupled to fringe magnetic fields that are generated in the final power feed on Z. Short-circuit IDTL experiments on Z have demonstrated that 10–200+ kA of current can be driven in an IDTL without perturbing the primary load. Given these results, a surrogate IDTL platform has been developed on the 1-MA Mykonos facility to enable rapid X-pinch source development. In this paper, short-circuit IDTL results are presented from both high-current IDTLs that will ultimately be used to power X-pinchs as well as low-current IDTLs that serve as self-common-mode-rejecting load current monitors.

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