CIRCUIT MODEL FOR THE INVERSE Z-PINCH WIRE ARRAY SWITCH

E. M. Waisman, M. E. Cuneo
Sandia National Laboratories*, Albuquerque, NM 87185, USA

S. V. Lebedev, A. Harvey-Thompson
The Blackett Laboratory, Imperial College, London SW7 2BW, UK

A 0D circuit code is introduced to study the wire array switch concept introduced in [1,2]. It has been implemented and researched at Imperial College [2,3]. An exploding wire array, the switch, is in parallel with the load, an imploding wire array. Most of the current flows in the exploding array until it expands and becomes highly resistive. The 0D code contains simple models of Joule energy deposition and plasma expansion for W and Al wires. The purpose of the device is to produce fast Z-pinch implosion, below 100ns on MAGPIE and the Sandia Z machine. Self and mutual inductances are taken into consideration as well as the rocket model for wire ablation. The switch characteristics of the exploding array are prescribed and tuned up to agree with MAGPIE shots. The dependence of the device on the configuration of the arrays is studied and scaling to ZR conditions is explored.

1. A. Harvey-Thompson, S.V. Lebedev, S.N. Bland et al., PoP **16**, 022701 (2009).
2. S.V. Lebedev A. Harvey-Thompson, G.N. Hall et al., BAPS.2009.DPP.GO5.5 (2009).
3. S.V. Lebedev A. Harvey-Thompson, G.N. Hall et al., this conference.

---

* Sandia National Laboratories is a multiprogram laboratory operated by Sandia Corporation, a Lockheed Martin Company, for the US Department of Energy under Contract No. DE-ACO4-94AL85000.