

X PINCH WITH CONICAL ELECTRODES

Tatiana A. Shelkovenko, Sergey A. Pikuz, Adam D. Cahill
Jack T. Blanchard and David A. Hammer
*Laboratory of Plasma Studies,
Cornell University, 439 Rhodes Hall
Ithaca, NY 14853, USA*

Daniel B. Sinars
*Sandia National Laboratories,
P.O. Box 5800, Albuquerque, NM 87185, USA*

A standard X pinch consists of two or more fine wires that cross at a single point as the load of a 200-500 kA pulsed power generator. At the MA current level, multi-wire, multi-layer and solid conical X pinches have been proposed and tested^{1,2}. To simplify the X pinch load while retaining the favorable properties of the fine wire loads achieved at the 200-500 kA level, a hybrid configuration consisting of solid conical electrodes connected by a wire has been tested on the XP generator (45 ns risetime, 500 kA current). The X pinch consists of 60° cone electrodes made of tungsten with 5% copper with a 0.6-1.3 mm long wire between them. Al, Ti, Ni, NiCr, Cu, Mo, Pd, W and Au wires were loaded through 1 mm holes in the cones and tested in the experiments. Most of the wires were 50 μm diameter. In the experiments, most of the X pinches generate an intense single burst of soft x-rays and develop a single hot spot that is less than 3 μm diameter. Also, they generate less hard x-ray intensity than is measured in standard X pinches. The new configuration can be used to design a system for reloading X pinches under vacuum for application as a source of x-ray radiation for point-projection backlighting of different plasma and biological objects.

1. D. B. Sinars *et al.*, Phys. Plasmas **15**, 092793 (2008).
2. T. A. Shelkovenko *et al.*, Phys. Plasmas **16**, 050702 (2009).

* Work supported by the SSAA program of the NNSA under DOE Cooperative Agreement DE-FC03-02NA00057.