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Design of a Flow Switch for Optimized X-Ray Yield on Z[1]
SOPHIE CHANTRENNE[2], MICHAEL CUNEO, THOMAS HAILL, THOMAS MEHLHORN, THOMAS NASH, EDUARDO WAISMAN[3], Sandia National Laboratory — In wire array z-pinch applications it may be desirable to have a faster rising current pulse to decrease the wire array implosion time. A reduced implosion time will result in a higher implosion velocity and should therefore increase the peak radiated x-ray power at stagnation. Faster rising current pulses may also permit high x-ray power from smaller diameter wire arrays that could enhance the x-ray drive temperature from more compact hohlraums. In this work, we present results from a design study of a plasma flow switch for the Z accelerator. We would like to compress the pulse by a factor of two with a flow switch that allows the current to be stored in the vacuum for up to 50 ns before it is delivered to a wire array load on the Z Accelerator. We use 2D r-z simulations of a flow switch with the ALEGRA MHD code. Different geometries, flow switch mass, and wire array mass and other conditions were tested and compared in order to obtain an initial flow switch design.

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[2]Ktech Corporation, Albuquerque, NM
[3]Sandia National Laboratory consultant, San Diego, CA

Sophie Chantrenne
Sandia National Laboratory

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