Abstract Submitted
for the DPP13 Meeting of
The American Physical Society

High gain fusion in a Staged Z-pinch PAUL NEY, Mount San Jacinto College, Menifee, HAFIZ RAHMAN, University of Nevada, Reno, FRANK WESSEL, University of California, Irvine, RADU PRESURA, University of Nevada, Reno — The implosion of a Staged Z-pinch[1] is simulated for the Sandia National Laboratories, ZR accelerator. The pinch is comprised of a silver (Ag) plasma shell, 3-mm outer radius, 0.01-cm thick, imploding onto a uniform fill (target) of deuterium-tritium (DT); the Z-R parameters are: 130 ns, 27 MA, 22 MJ; the 2-1/2 D, radiation-MHD code is MACH2. Magnetosonic shock waves generated during implosion propagate at different speeds in the liner and target, producing a shock front at the interface, and a conduction channel ahead of the liner. The interface remains stable even as the outer-surface of the liner is RT unstable. At peak compression target plasma hot spots trigger ignition with a fusion yield of 200 MJ and a net-energy gain approaching 10. The stability remains robust and the gain is unaffected for perturbations ranging from 2-5%.

[1]H. U. Rahman, F. J. Wessel, and N. Rostoker. Staged z-pinch. PRL, 74:714, 1995.

Frank Wessel
Tri Alpha Energy, Inc.

Date submitted: 12 Jul 2013 Electronic form version 1.4