Abstract Submitted
for the DPP11 Meeting of
The American Physical Society

Simulation of quasi spherical direct drive capsules for pulsed-power driven inertial fusion energy[1] J.P. VANDEVENDER, VanDevender Enterprises, S.A. SLUTZ, R.A. VESEY, M.C. HERRMANN, D.B. SINARS, T.J. NASH, Sandia National Laboratories, N.F. RODERICK, U. of New Mexico, A.B. SEFKOW, Sandia National Laboratories — Magnetic pressure from 35-MA current in a 1-mm-radius liner is equivalent to the ablation pressure in the beryllium pusher of an inertial fusion capsule in a 300 eV hohlraum and can, in principle, drive a Quasi Spherical Direct Drive (QSDD) fusion capsule to yields of ∼600 MJ with a 45 MA, 40 ns pulsed power driver. Analytic theory and 1D and 2D simulations of QSDD capsules show insensitivity to magnetic Rayleigh-Taylor instability, internal pulse shaping, efficient compression of cryogenic fuel on a low (α=1.5) adiabat, hot spot heating, current diffusion into the hot spot with alpha trapping, and burn. However, practical QSDD capsules require a large rate of change of current dI/dt ∼1.5 MA/ns and are susceptible to a wall instability, which must be further mitigated.

[1]Sandia National Laboratories is managed and operated by Sandia Corporation, a wholly owned subsidiary of Lockheed Martin Corporation, for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000.

J. Pace VanDevender
VanDevender Enterprises

Date submitted: 25 Jul 2011 Electronic form version 1.4