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Bounce-free spherical hydrodynamic implosion[1] GRIGORY KAGAN, Los Alamos National Laboratory, XIAN-ZHU TANG, SCOTT C. HSU, THOMAS J. AWE — In a bounce-free spherical hydrodynamic implosion, the post-stagnation hot core plasma does not expand against the imploding flow. A solution family realizing such a regime has been explicitly found. This regime found is most naturally applied and would be of most benefit to plasma liner driven magneto-inertial fusion (MIF). That is, this version of inertial confinement relies on maintaining the compressed hot spot within the thermonuclear burning condition for as long as possible, rather than on initiating the burn wave. Consequently, in MIF it is the best-case scenario that the fuel target persists in the state of maximum compression after reaching stagnation. Also, the plasma liner driven MIF provides substantial freedom in shaping the profiles of the imploding flow (i.e. liner) pressure, density and fluid velocity. By comparing the fuel disassembly time against that of a stationary imploding flow case, we find that shaping this flow appropriately is likely to increase the dwell time and fusion gain by a factor of four or more. Moreover, in this newly found regime the shocked region of the liner is at rest. That is, the kinetic energy of the original liner is entirely converted into internal energy. Hence, our result supports the idea of using the deuterium-tritium in the inner parts of the liner or the so-called "after-burner," which upon becoming shocked will also burn, thus further increasing the gain.

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