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Theoretical investigation of Laser Beatwave Magnetization of Liner-Compressed High Energy Density Plasmas[1] CARSTEN THOMA, DALE WELCH, ROBERT CLARK, Voss Scientific, LLC — The interaction of two lasers with difference frequencies equal that of the ambient plasma frequency produces beat waves. These waves can be used to drive electron current and remotely embed magnetic fields. This method can provide standoff magnetization in an imploding high energy density plasma as envisioned in magnetized target fusion schemes. We discuss the results of particle-in-cell simulations of laser beatwave current drive and magnetization in plasmas with densities on the order of 10^{18} cm^{-3}. At such densities, lasers with ~ 1 μm wavelength can generate magnetic fields on the order of a Tesla, for powers $\sim 10^{15}$ W/cm^2, and pulse lengths of several ps. We consider the generation varied magnetic topologies by using multiple laser pairs. The evolution of current channels over timescales longer than the laser pulse duration is also described. We illustrate the effects of liner-driven hydrodynamic compression on the embedded magnetic fields in 1D and 2D simulations using the Lsp code.

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