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Effects of external and self-generated magnetic fields on laser-driven implosions[1] O. POLOMAROV, P. CHANG, O. GOTCHEV, R. BETTI, FSC/LLE, U. of Rochester — The magnetized laser-driven implosions are studied using ALE hydro-code DRACO coupled with the newly developed MHD block (with anisotropic, $\boldsymbol{B}$-dependent transport coefficients). Considered: i) compression of an externally imposed magnetic field and ii) self-generation of the magnetic field by non-collinear density and pressure gradients. For the first case, it is shown that the moderate external magnetic field of (<10 Tesla) can be compressed to hundreds of Mega-Gauss at the implosion stagnation [O. Gotchev et al., submitted to PRL, (2009)]. The field of such amplitude can influence the thermal flux from the target core and results in noticeable effects on the target hydro-dynamics. For the second case, it is shown that the self-generated magnetic field can be amplified to the multi-mega-gauss level at the different implosion stages by at least three MHD-related mechanisms: i) the Tidman instability due to a lateral $\boldsymbol{B}$-dependent heat flux, ii) the Rayleigh-Taylor instability at the ablation front and, iii) the corrugation instability of spherical shock fronts. It is also shown that the magnetic field initially produced at the critical surface significantly reduces the imprinting of laser irradiation non-uniformities onto the ablation surface.

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