Magnetic Reconnection of an Externally Applied Magnetic Field in a High-Energy Density Plasma

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Two counter-propagating plasma flows were created by irradiating oppositely placed plastic (CH) targets with 1.8-kJ, 2-ns laser beams. An external magnetic field was imposed perpendicular to the plasma flow by MIFEDS (magneto-inertial fusion electrical discharge system). 2 The magnetic field has a null-x-point geometry with $B = 5$ T at the targets. The plasma interaction was imaged by laser-driven, fast-proton radiography. The radiography images demonstrate formation of a pair of counter-propagating magnetized “ribbons” that collide and reconnect at the midplane. The results will be compared with particle-in-cell simulations and interpreted with predictions from the DRACO code. This material is based upon work supported by the Department of Energy National Nuclear Security Administration under Award Number DE-NA0001944, and NLUF Grant DE-SC0008655.