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On the magnetized disruption of inertially-confined plasma flows

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The creation and disruption of inertially-collimated plasma flows is investigated through experiment, simulation, and analytical modeling. Laser-generated plasma-jets are shown to be disrupted by an applied 5T B-field along the jet axis. An analytical model of the system describes the disruption mechanism through the competing effects of B-field advection and diffusion. These results indicate that for Re_m ~10-100, the ratio of inertial to magnetic pressures plays an important role in determining whether a jet is formed, but at high enough Re_m, axial B-field amplification prevents inertial collimation altogether. This work is funded by the U.S. DOE, through the NNSA-DS and SC-OFES Joint Program in HED Laboratory Plasmas, grant number DE-NA0001840 and in collaboration with LLNL under contract DE-AC52-07NA27344. Support for this work was provided by NASA, under contract NAS8-03060, through Einstein Postdoctoral Fellowship grant number PF3-140111. Software used in this work was developed in part by the DOE NNSA ASC- and DOE Office of Science ASCR-supported Flash Center.

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