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Self-generated Magnetic Fields in Blast-wave Driven Rayleigh-Taylor Experiments[1] MARKUS FLAIG, TOMASZ PLEWA, Florida State University — We study the generation of magnetic fields via the Biermann battery effect in blast-wave driven Rayleigh-Taylor experiments. Previous estimates have shown that in a typical experiment, one should expect fields in the MG range to be generated, with the potential to influence the Rayleigh-Taylor morphology. We perform two- and three-dimensional numerical simulations, where we solve the extended set of MHD equations known as the Braginskii equations. The simulation parameters reflect the physical conditions in past experiments performed on the OMEGA laser and potential future experiments on the NIF laser facility. When neglecting the friction force between electrons and ions in the simulations, magnetic fields of the order of a few 0.1 MG (with a plasma smaller than 1000) are generated, and are found to be dynamically significant. However, it turns out that once the friction force is included, the magnetic fields become much smaller (with a plasma beta greater than 100000) which have negligible influence on the dynamics of the system. Our results therefore indicate that, contrary to previous speculations, it is highly unlikely that self-generated magnetic fields can influence the morphology of a typical blast-wave driven Rayleigh-Taylor experiment.

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