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Design of a high energy density experiment for measuring the suppression of the Rayleigh-Taylor instability in an applied magnetic field[1] ZOE BARBEAU, Stanford University, KUMAR RAMAN, SABRINA NAGEL, Lawrence Livermore National Laboratory, MARIO MANUEL, General Atomics — We simulate the suppression of the 2D Rayleigh Taylor Instability (RTI) in an external magnetic field at high energy density conditions in order to design a target package for a Discovery Science experiment at the National Ignition Facility investigating this effect. Our simulations indicate magnetic tension is the key suppression mechanism, resistive MHD effects are important and point to target designs involving low-density materials. Simulations show that at NIF-scale, resistive MHD allows the magnetic field to diffuse ahead of the shock front and RTI growth if the plasma conductivity is insufficient. Low density allows for faster hydrodynamics and higher conductivity mitigating the issue of the magnetic field diffusing away. With the low-density target, we observe noticeable RTI suppression in a 30 T By-field compared to a 0 T field.

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