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Experimental Study of the Magnetic Rayleigh-Taylor Instability[1]

R. PRESURA, V.I. SOTNIKOV, C. PLECHATY, S. WRIGHT, S. NEFF, D. MARTINEZ, Nevada Terawatt Facility, University of Nevada, Reno — Dynamic plasma – magnetic field interfaces are sites of interchange instabilities in a variety of instances, from the pinch effect to supernova explosions in the interstellar magnetic field. In experiments at the Nevada Terawatt Facility, the development of the Rayleigh-Taylor instability (RTI) was investigated at the front of plasma flows decelerated by external magnetic field. The plasma flow was produced by laser ablation and the magnetic field was produced independently, using a pulsed power generator. Varying the energy and the duration of the laser pulse led to the variation of the plasma parameters and consequently of the mechanism of RTI growth. The usual magneto-RTI ($k\rho_i << 1$) and the large-Larmor-radius-RTI ($k\rho_i >> 1$) were actuated in experiments (k is the wavenumber and ρ_i is the ion Larmor radius). In principle, this approach allows access to the finite Larmor radius region, predicted theoretically to have a stabilizing effect upon the RTI.

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