Experimental tests of Rayleigh-Taylor stabilization mechanisms with long pulse gas-filled halfraums on OMEGA

A. CASNER, G. HUSER, M. VANDENBOOMGAERDE, S. LIBERATORE, L. MASSE, D. GALMICHE, CEA Centre DAM - Ile de France Bruyeres le Chatel F-91297 Arpajon cedex, France

Mitigation of Rayleigh-Taylor instabilities growth is a key issue on the road toward ignition. The graded doped ablator is a common concept for NIF [1] and LMJ [2] point designs. A complementary stabilization mechanism based on anisotropic thermal diffusion was theoretically underlined [3] for the ablative Rayleigh-Taylor instability. We will present the first ever experimental tests of these mechanisms. Indirect drive experiments were performed on the OMEGA laser facility with a long-pulse platform. We used in fact gas-filled halfraums and stack 15 drive beams along 2 cones to create a 7 ns long radiation drive. Halfraum energetics with E-ID1-300 phase plates was validated by dedicated shots along P5/P8 and is fairly reproduced by the simulations. These drive measurements allowed also to determine the graded doped planar emulator whose layers thicknesses and composition should be carefully optimized. Side-on and face-on data acquired with germanium-doped plastic samples (modulations wavelength 35 and 50 microns) will be presented and compared with FC12 hydrocodes simulations. [1] S.W. Haan et al., Phys. Plasmas 12, 056316 (2005). [2] C C-Clérouin et al 2008 J. Phys.: Conf. Ser. 112 022023 [3] L. Masse., Phys. Rev. Lett. 98, 245001 (2007).