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Rayleigh-Taylor instability of two-specie laser-accelerated foils T.H. RATLIFF, Univ Texas Austin, Dept Phys, Austin, TX 78712 USA, S.A. YI, V. KHUDIK, T.P. YU, A. PUKHOV, M. CHEN, G. SHVETS — When an ultra intense circularly polarized laser pulse irradiates an ultra thin film, a monoenergetic ion beam is produced with characteristics well suited for applications in science and medicine. Upon laser incidence, the electrons in the foil are pushed via the ponderomotive force to the foil rear; the charge separation field then accelerates ions. In the accelerating frame the ions are trapped in a potential well formed by the electrostatic and inertial forces. However, their energy spectrum can be quickly degraded by the Rayleigh-Taylor (RT) instability. Stabilization in the case of a two-specie foil is the subject of this poster. First, we use a 1D particle-in-cell (PIC) simulation to establish an equilibrium state of the two-specie foil in the accelerating frame. Next we perturb this equilibrium and analytically investigate the 2D RT instability. Analytical results are compared with 2-D simulations. We also investigate parametrically various effects on the RT growth rate. The protons completely separate from the carbons, and although the vacuum-carbon interface remains unstable, the large spatial extent of the carbon layer prevents perturbations from feeding through to the proton layer. The monoenergetic proton beam is shown to persist beyond the conclusion of the laser pulse interaction. [1] T.P. Yu, A. Pukhov, G. Shvets, and M Chen, Phys. Rev. Lett. (in press)

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