Abstract Submitted
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Mono-energetic ion acceleration in the RPA regime: a tale of two temperatures[1] VLADIMIR KHUDIK, GENNADY SHVETS, Department of Physics and Institute for Fusion Studies, The University of Texas at Austin — We develop an analytical theory of the laser-accelerated plasma target irradiated by a circularly polarized laser pulse in the RPA regime. We demonstrate that relationship between electron and ion temperatures is the key to understanding the structure of the accelerated target. To illustrate this point, we discuss two simplest analytically treatable limiting cases of (1) cold ions and hot electrons [1], and (2) hot ions and cold electrons. In the first case, hot electrons bounce back and forth inside the potential well formed by ponderomotive and electrostatic potentials while the ions are force-balanced by the electrostatic and non-inertial fields. In the second case the situation is very different: hot ions are trapped in the potential well formed by the ion-sheath's electric and non-inertial potentials while the cold electrons are force-balanced by the electrostatic and ponderomotive fields. Using PIC simulations we study the target stability with respect to Rayleigh-Taylor instability [1,2].

[1] V. Khudik, S. A. Yi, C. Siemon, and G. Shvets, Phys. Plasmas, 21, 0013110 (2014).
[2] T.P. Yu, A. Pukhov, G. Shvets, M. Chen, T. H. Ratliff, S. A. Yi, and V. Khudik, Phys. Plasmas, 18, 043110 (2011).

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