Monoenergetic ion beam production through the generation of ion solitary waves in relativistically transparent plasma with a high intensity circularly polarized laser¹ B.J. ALBRIGHT, L. YIN, D. JUNG, K.J. BOWERS, R. SHAH, S. PALANIYAPPAN, J.C. FERNÁNDEZ, B.M. HEGELICH, Los Alamos National Laboratory — Experiments at the LANL Trident user facility have yielded quasi-monoenergetic ion beams from the interaction of an ultraintense, circularly polarized laser with a solid density, nm-scale target under conditions of ultrahigh laser pulse contrast [1]. Kinetic modeling shows that after a brief radiation pressure acceleration phase, the plasma turns relativistically transparent and nonlinear ion density spikes propagate across the plasma in a manner that efficiently couples laser energy into ion kinetic energy [2]. Understanding the governing physics is possible with an application of analytic theory, shown to reproduce the features of these solitary waves. This theory will be discussed along with how to optimize energy and degree of monoenergeticity of this novel class of laser-generated ion beams.


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