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Shocks waves in high power laser plasma interactions R. BINGHAM, STFC Rutherford Appleton Laboratory, Didcot, UK and University of Strathclyde, Glasgow, UK, R.A. CAIRNS, University of St Andrews, Fife, UK, P.A. NORREYS, University of Oxford, Oxford, UK and STFC Rutherford Appleton Laboratory, Didcot, UK, R. TRINES, STFC Rutherford Appleton Laboratory, Didcot, UK
— Some recent experiments on the interaction of high power lasers with plasmas have shown evidence of shock like structures with very high electric fields existing over very short distances. In inertial confinement fusion capsules the existence of fields of more than 10^{10} V/m over distances of the order of 10-100 nm have been observed. In other experiments with intense lasers interacting with over dense plasmas high energy proton beams with small energy spread are observed. We propose a theory to describe laminar ion sound structures in a collisionless plasma. Reflection of a small fraction of the upstream ions converts the well-known ion acoustic soliton into a structure with a steep potential gradient upstream and with downstream oscillations. The strong electric field is also responsible for separation in the shocked region in a deuterium, tritium mix, while accelerating the deuterium and tritium ions at the shock front. The possibility of using these accelerated ions to heat the fuel in a fast ignition scheme will be discussed.

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