Reduced Phase-Space Models of Intense Laser-Plasma Interactions

B.A. SHADWICK, Department of Physics and Astronomy, University of Nebraska Lincoln and Institute for Advanced Physics, C.B. SCHROEDER, LOASIS Program, LBNL, G.M. TARKENTON, Institute for Advanced Physics, E. ESAREY, LOASIS Program, LBNL — We undertake a detailed comparison of a variety of reduced models — moment based descriptions: warm and cold fluids as well as fixed-shape distributions: water bag, etc. — to direct solutions of 1-D Vlasov equation. We examine the quality of the agreement between the various models as a function of both initial plasma temperature and plasma wave amplitude. We determine parameter regimes of validity for the various reduced models and comment on applicability of these models to studying laser-driven plasma accelerators.

1Supported by the University of Nebraska, the Institute for Advanced Physics and by US DoE contract DE-AC02-05CH11231