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Kinetic and Collisional Effects on the Linear and Non-Linear Evolution of Fast Ignition Relevant Beam Instabilities LARISSA A. COTTRILL, B.F. LASINSKI, S.M. LUND, M. TABAK, R.P.J. TOWN, Lawrence Livermore National Laboratory — A crucial issue surrounding the feasibility of fast ignition is the ability to efficiently couple energy from an incident short-pulse laser to a high-density, pre-compressed fuel core. Energy transfer will involve the generation and transport of a relativistic electron beam, which may be subject to a number of instabilities that act to inhibit energy transport. The initial linear and later nonlinear growth phases of these instabilities will evolve differently depending on a number of issues such as the initial beam distribution and collisional effects. Analytical calculations will be presented in the collisionless and collisional limits to demonstrate differences in instability growth in the linear growth phase for advanced distributions such as the relativistic Maxwellian and waterbag, as well as a distribution extracted from explicit PIC simulations of the laser-plasma interaction. Simulations from the LSP code will also be shown to highlight beam transport issues in the nonlinear saturated state. This work was performed under the auspices of the U.S. Department of Energy by the University of California, Lawrence Livermore National Laboratory under contract W-7405-ENG-48.

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