Particle-in-cell Simulations of laser plasma interactions near the quarter critical surface\textsuperscript{1} FRANK TSUNG, UCLA, B.B. AFYAN, Polymath Research INC, W.B. MORI, UCLA — We present simulation results on the laser-plasma interaction near the quarter critical surface under conditions relevant to inertial fusion. Under these conditions, the high frequency hybrid instability (HFHI) where the backward going daughter wave have mixed polarizations, may be important in both the early and nonlinear regimes. We find in high temperature plasmas where HFHI modes are important that the absorption level can be high (up to 40\%) for systems which are below the two plasmon threshold. This result implies, for laser pulses with a long (compared to the instability growth time, in the order of 1ps) rise time, the mixed polarization modes with small perpendicular wavenumber can significantly modify the plasma conditions before the laser greatly exceeds the threshold. We also will present results for when the laser intensity is adiabatically increased. Other nonlinearities such as the generation of hot electrons, the generation of half harmonics, and the effects of overlapping beams will also be discussed.

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