Abstract Submitted
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Nonlinear electron cyclotron current drive by high intensity, pulsed, beams[1] K. HIZANIDIS, NTUA, Greece, A. K. RAM, R. J. TEMKIN, MIT, P. ZESTANAKIS, G. ANASTASIOU, NTUA, Greece — There have been significant advances in the technology of high-powered microwave sources since free-electron lasers were used in the Microwave Tokamak Experiment (MTX) in 1990s. These advances have led us to reexamine nonlinear current drive by high intensity, pulsed beams. We have been studying the relativistic nonlinear interaction of electrons with Gaussian beams in the electron cyclotron range of frequencies. The Gaussian beam is analytically constructed so as to satisfy Maxwell's equations for a cold, magnetized plasma. The electrons are initially distributed homogeneously in space while having a Maxwell-Juttner distribution in momentum space. As the electrons interact with the beam, the components of their momenta, along and across the magnetic field, vary with beam power and its direction of propagation. The electron motion is affected by the ponderomotive force due to the spatial variation of the beam, and by trapping within the beam. Results for the gain in energy and momentum of the electrons, as a function of beam parameters and wave polarization will be presented. The impact of the ponderomotive force and of trapping on the efficiency of current drive is evaluated.

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