

Abstract Submitted
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Beat Wave Generation and Current Drive in Unmagnetized Plasmas¹ DALE WELCH, Voss Scientific, SCOTT HSU, Los Alamos National Laboratory, DAVID ROSE, CARSTEN THOMA, THOMAS GENONI, Voss Scientific — This work describes the scientific basis and associated simulation results for magnetization of an unmagnetized plasma via beat wave current drive. The technique could enable a variety of novel plasma experiments in which the use of magnetic coils is infeasible. Two-dimensional electromagnetic particle-in-cell simulations have been performed for a variety of angles between the injected waves to demonstrate beat wave generation in agreement with theoretical predictions of the beat-wave wavevector and saturation time. The simulations also clearly demonstrate electron acceleration by the beat waves and resultant current drive and magnetic field generation. The entire process depends on the angle between the parent waves and the ratio of the beat-wave phase velocity to the electron thermal velocity. The wave to magnetic energy conversion efficiency of the cases examined is as high as 0.2%.

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