Abstract Submitted
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Quasilinear kinetic formulation of wave-particle interactions in RF heating and current drive Y. KOMINIS, K. HIZANIDIS, NTUA, Athens, Greece, A.K. RAM, PSFC, MIT — In fusion plasmas, coherent RF waves are routinely used for heating the plasma and for controlling the current profile. RF waves alter the particle distribution function away from an equilibrium Maxwell-Boltzmann distribution through wave-particle interactions. Meanwhile, collisions try to restore the distribution function to its equilibrium state. In high-temperature plasmas, the modification due to RF waves occurs over time scales much shorter than collisional times. In this long mean-free path limit, particles interacting with RF waves do not undergo Brownian or Markovian diffusion. There persist long time correlations which invalidate Markovian assumption inherent in the usual quasilinear models. We have recently developed a quasilinear theory for particles interacting with coherent RF waves in the long mean-free path limit [1]. The distribution function is evolved concurrently with the particle motion and takes into account the complexity of the dynamical phase space in the presence of RF waves. In stark contrast to the usual quasilinear theories, the wave-particle interaction operator in the evolution equation is time dependent resulting in markedly different results. This will be illustrated by comparing averaged quantities like current and temperature. Supported by DoE, EFDA, and Assoc. EURATOM-Helenic Republic.

[1] Y. Kominis, A.K. Ram and K. Hizanidis, *Phys. Rev. Lett.* **104**, 235001 (2010).

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