

Abstract Submitted
for the DPP14 Meeting of
The American Physical Society

Global particle simulation of lower hybrid waves in fusion plasmas¹ JIAN BAO, ZHIHONG LIN, ANIMESH KULEY, Univ of California - Irvine, ZHIXIN LU, Univ of California - San Diego, ZHIXUAN WANG, Univ of California - Irvine — Global particle simulations of the lower hybrid (LH) waves have been carried out based on the first principle, which use the fully kinetic ion/drift kinetic electron model with a realistic electron-to-ion mass ratio. The LH wave frequency, mode structure, and electron Landau damping from the electrostatic simulations agree very well with the analytic theory. Linear simulation of the propagation of a LH wave-packet in the toroidal geometry shows that the wave propagates faster in the high field side than the low field side, in agreement with a ray tracing calculation. This poloidal asymmetry arises from the non-conservation of the poloidal mode number due to the non-uniform magnetic field. In contrast, the poloidal mode number is conserved in the cylindrical geometry with the uniform magnetic field. Furthermore, an electromagnetic particle simulation model is developed to study the accessibility of LH waves based on the first principle, the dispersion relations of the slow and fast waves in LH frequency range are well benchmarked. The mode-conversion between slow and fast waves is observed, which is consistent with the theory.

¹This work is supported by China National Magnetic Confinement Fusion Science Program (Grant No. 2013GB111000) and U.S. Department of Energy SciDAC GSEP Center.

Jian Bao
Univ of California - Irvine

Date submitted: 10 Jul 2014

Electronic form version 1.4