Abstract Submitted
for the GEC18 Meeting of
The American Physical Society

The excitation of the Bernstein waves in magnetized capacitive helium discharge.[1] SHALI YANG, Huazhong University of Science and Technology China; Princeton Plasma Physics Lab, ALEXANDER KHRABROV, Princeton Plasma Physics Lab, SARVESH SHARMA, Institute for Plasma Research India, WEI JIANG, Huazhong University of Science Technology, PHILIP EFTHIMION, IGOR KAGANOVICH, Princeton Plasma Physics Lab — The Bernstein waves are short wavelength electrostatic waves in the magnetized plasma, which have been widely studied in fusion plasma physics. In this work, we present the numerical evidence of the excitation of the Bernstein waves in low-temperature capacitively coupled plasmas. Our simulations have been performed with a 1D implicit PIC/MC code. Oscillation structures can be clearly observed in the spatio-temporal profiles of the electron current density at the magnetic field of 5-30G. This can be understood as the excitation of the Bernstein waves, because the signature of the excitation of Bernstein waves is that they are excited at multiple of the cyclotron frequency by nonlinear resonances with the RF frequency($n\omega_c = m\omega$), where n, m are the integer numbers. We also verified that the necessary condition of excitation of the Bernstein waves is that the electron collision frequency is lower than the electron cyclotron frequency. Besides, the electron energy distribution function (EEDF) profiles at the dischrge center show that the component of high-energy electrons is increased when the Bernstein waves exist, which revealing that the Bernstein waves will heat the electrons effectively.

[1]This work was supported by US department of energy

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Date submitted: 15 Jun 2018 Electronic form version 1.4