

Abstract Submitted
for the DPP13 Meeting of
The American Physical Society

Study of two-stream instability in low-pressure discharge¹ GUIQIU WANG, Dalian Maritime University, Princeton Plasma Physics Laboratory, IGOR KAGANOVICH, ALEXANDER KHRABROV, Princeton Plasma Physics Laboratory, DMYTRO SYDORENKO, University of Alberta, HONGYUE WANG, Princeton Plasma Physics Laboratory, Beihang University — Electron emission from discharge chamber wall is important in low-pressure discharges, such as capacitively coupled plasma (CCP), divertor plasmas, direct current cathode discharges, direct current magnetrons, multipactors, electrostatic, Hall thruster and so on. It is well known that the electrons emitted from the wall are accelerated into plasma by the electric field in the sheath adjacent to the wall and form an electron beam. Such beams on the one hand play an important role in the maintenance of discharge and affect plasma and sheath characteristics, on the other hand, they may excite the two-stream instability in the plasma. As a result, the beam electrons are slowed down and the plasma electrons are heated. In this work, a one-dimensional Particle-in-Cell (PIC) simulation is carried out to study these effects in low-pressure discharge. The relationship between Electron velocity distribution function (EVDF) of plasma-beam system and the two-stream instability whether happens is discussed and the dispersion relation is studied in detail when the two-stream instability occurs.

¹Supported by the National Natural Science Foundation of China Grants No. 10705007 and the Fundamental Research Funds for the Central Universities of China.

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Date submitted: 11 Jul 2013

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