

Abstract Submitted
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Excitation of Ion Acoustic Waves by Electron Beams¹ DMYTRO SYDORENKO, University of Alberta, Canada, ERINC TOKLUOGLU, IGOR KAGANOVICH, EDWARD STARTSEV, RONALD DAVIDSON, PPPL, UNIVERSITY OF ALBERTA, CANADA COLLABORATION, PPPL TEAM — The interaction of electron beams with plasmas is of considerable importance particularly for hybrid DC/RF coupled plasma sources used in plasma processing [1]. An electron beam is formed by emission from one surface, is accelerated through a dc bias electric field and enters the bulk plasma. Emitted electrons excite electron plasma (Langmuir) waves through the two-stream instability. Due to the high localized plasmon pressure, ion acoustic waves are excited parametrically. The plasma waves saturate by non-linear wave trapping. Eventually coupling between electron plasma waves and ion acoustic waves deteriorates the Langmuir waves, which leads to a bursting behavior. The two-stream instability and the consequent ion fluctuations are studied over a wide range of system parameters using the particle-in-cell codes EDIPIC and LSP. The influence of these instabilities on collisionless electron heating are presented for a hybrid RF-DC plasma source.

[1] Lin Xu, et al, Appl. Phys. Lett., 93, 261502 (2008).

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