On Generation of Langmuir Turbulence by Electron Beams Steadily Injected into a Flaring Atmosphere

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We study generation of Langmuir wave turbulence during precipitation of an electron beam steadily injected into the solar atmosphere in the presence of collisional and Ohmic losses following the methodology by Siversky and Zharkova, 2009.. The two cases are considered: evolution of an initially unstable beam on a short time scale and of initially stable beam on a longer time scale. The initially unstable beam, which has the positive energy slope at energies below the lower energy cutoff, generates Langmuir waves at the timescales much shorter than the corresponding collisional scales leading to flattening of the low energy part of the electron distribution function. The initially stable beam reveals the energy distributions at deeper layers of solar atmosphere with a maximum formed by the collisional and Ohmic energy losses generating Langmuir waves in the upper chromosphere on relatively long time and length scales. The self-induced electric field of an electron beam is shown to reduce a magnitude and spread of the long-term Langmuir turbulence.

Keywords: electron beam; electron precipitation; self-induced electric field, beam instability; Langmuir wave turbulence.

References

[1] Siversky T. and Zharkova, *Astron. Astrophys.* 504/3, 1057 (2009).