

Abstract Submitted
for the GEC18 Meeting of
The American Physical Society

Nonlinear circuit analysis of intermodulation currents via plasma sheath in a floating Langmuir probe KYUNG-HYUN KIM, MOO-YOUNG LEE, CHIN-WOOK CHUNG, Hanyang Univ — When dual frequency ω_1, ω_2 voltage having small amplitude are biased to a floating Langmuir probe, intermodulation currents $i_{\omega_2 \pm \omega_1}, i_{\omega_2 \pm 2\omega_1}$ are generated due to nonlinearity of sheath near the probe. From the intermodulation currents, electron temperatures and plasma densities can be obtained. If the probe has a capacitive load such as contaminated tip of the probe, harmonic and intermodulation voltages of the probe bias are applied to the sheath. The currents are split into several harmonic currents through harmonic balance technique that analyzes nonlinear circuit. The sum of the harmonic currents was compared with the measured intermodulation current. Electron temperature and plasma density obtained from the currents were compared to that of a single Langmuir probe.

Kyung-Hyun Kim
Hanyang Univ

Date submitted: 18 Jun 2018

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