

# Formation of Non-equilibrium EEDF in Non-uniform RF Plasmas

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Ionization and electron energy balances in uniform along the heating electric field plasmas with Maxwellian electron energy distribution function, EEDF have some fundamental consequences. In such plasmas, the electron temperature does not depend on discharge power and on electron heating mechanism, being solely function of the product of gas pressure  $p$  and characteristic plasma size  $\Lambda$ , while the total number of plasma electron  $N$  is proportional to the power absorbed by the electrons  $P_d$ ;  $T_e = T_e(p\Lambda)$  and  $N \sim P_d$ . In real RF discharges at low gas pressure, the EEDF is not Maxwellian and has different behavior in elastic ( $\epsilon < \epsilon^*$ ) an inelastic ( $\epsilon > \epsilon^*$ ) energy range. In low pressure RF discharges, electron heating process occurs in non-uniform plasma with non-uniform electromagnetic field. At such condition the EEDF and its scalar integrals, like plasma density, mean electron energy and rates of plasma-chemical processes, are not local functions of electromagnetic field, (domain of nonlocal electron kinetics). Moreover, at the lowest gas pressure (mT range) RF current is not a local function of electric field, (domain of nonlocal plasma electrodynamics, anomalous skin effect). Variety of nonlocal kinetics and electrodynamics phenomena affects formation of EEDF in RF discharges. Mechanism of EEDF formation together with experimental data in RF capacitive and inductive discharges, dominated by nonlocal kinetics and nonlocal electrodynamics are considered in this presentation.