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Electron Kinetics in Helicon Discharge GUANGYE CHEN, LAXMINARAYAN RAJA, ALEXEY AREFIEV, BORIS BREIZMAN, The University of Texas at Austin — The Variable Specific Impulse Magnetoplasma Rocket (VASIMR) project employs helicon discharge as a plasma source [1]. A self-consistent description of the helicon discharge requires a power balance analysis, which involves electron kinetics. A steady-state electron distribution establishes when electron Ohmic heating becomes balanced by electron energy losses on atom excitation. RF-electric field and plasma density are the key parameters that determine features of the steady-state electron energy distribution function. The electron distribution has been studied in four different heating regimes using the Direct Simulation Monte Carlo method. We have found that the electron distribution is significantly non-Maxwellian in the dense gas regime, when elastic electron-atom collisions dominate. The non-Maxwellian feature of the electron distribution function has a strong impact on the cost of ionization in the discharge.

[1] F.R. Chang-Diaz, Sci. Am. **283**, 90 2000.

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