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EEDF and Plasma Parameters of an Argon Positive Column VALERY GODYAK, BENGAMIN ALEXANDROVICH, Retired, GEORGE PETROV, Naval Research Laboratory — The existing experimental data base on plasma properties of the positive column in noble gases was obtained during the past century with optical spectroscopy and Langmuir probe technique. The latter is based on the assumption of a Maxwellian electron energy distribution function (EEDF). However, numerous calculations for EEDFs and experiments in Ramsauer-type gases, such as Ne, Ar, Kr and Xe, have shown Druyvesteyn-like distributions in the elastic energy range, unless strong e-e collisions at large plasma density were able to Maxwellize the EEDF. Another source of error in Langmuir probe diagnostics in Ramsauer gases is a large uncertainty in determining the plasma potential that may result in significant error in estimation of the plasma density. It has been shown [1] that the only reliable way to find basic plasma parameters in such plasmas is the EEDF measurement with plasma parameters determined as appropriate integrals of the measured EEDF. In the present work, we carried out EEDF measurements in Ar and found plasma parameters as EEDF integrals in wide ranges of pressure (1 mTorr – 1 Torr) and discharge current (3mA -3A) in a positive column of DC discharge. The experimental results were compared with simulations based on solution of the one-dimensional electron Boltzmann equation [2] coupled with a set of equations for the plasma density and plasma potential [3]. The problems associated with EEDF measurements in DC plasmas prone to different kind of instabilities, as well as the area of the model applicability are discussed in this presentation. [1] V. Godyak, et al, J. Appl. Phys. **73**, 3657 (1993). [2] D. Uhrlandt and R. Winkler, J. Phys. D **29**, 115 (1996). [3] U. Kortshagen et al, Plasma Sources Sci. Tech. **5**, 1 (1996).

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