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Effect of anomalous electron cross-field transport on electron energy distribution function in a DC-RF magnetized plasma discharge[1]
YEVGENY RAITSES, Princeton Plasma Physics Laboratory, Princeton, NJ, VINCENT DONNELLY, University of Houston, Houston, TX, IGOR KAGANOVICH, Princeton Plasma Physics Laboratory, Princeton, NJ, VALERY GODYAK, University of Michigan, Ann Arbor, MI — The application of the magnetic field in a low pressure plasma can cause a spatial separation of cold and hot electron groups. This so-called magnetic filter effect is not well understood and is the subject of our studies. In this work, we investigate electron energy distribution function in a DC-RF plasma discharge with crossed electric and magnetic field operating at sub-mtorr pressure range of xenon gas [1]. Experimental studies showed that the increase of the magnetic field leads to a more uniform profile of the electron temperature across the magnetic field. This surprising result indicates the importance of anomalous electron transport that causes mixing of hot and cold electrons. High-speed imaging and probe measurements revealed a coherent structure rotating in E cross B direction with frequency of a few kHz. Similar to spoke oscillations reported for Hall thrusters [2], this rotating structure conducts the largest fraction of the cross-field current. [1] Y. Raitses, J. K. Hendryx, and N. J. Fisch, IEPC-2009-024, in the Proceedings of the 31st International Electric Propulsion Conference, September, 2009, Ann Arbor, MI; [2] C. L. Ellison, Y. Raitses and N. J. Fisch, Phys. Plasmas 19, 013503 (2012).

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