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Experimental measurement of electron energy distribution function of solitary electron holes SATYANANDA KAR, MANGI LAL, SUBROTO MUKHERJEE, ABHIJIT SEN, Institute for Plasma Research — A metallic disc electrode (exciter) is immersed in low pressure argon plasma. When the exciter is positively pulse biased, nonlinear solitary electron holes are excited [Kar et al., Phys. Plasmas, 17, 102113, (2010)]. The amplitude of SEHs decreases with distance from the exciter. So, for a change in the number of trapped electrons, the distribution function of SEHs would be changed. One should incorporate the electron energy distribution function (EEDF) to learn more about the microscopic details, e.g. the growth of holes in linearly stable plasmas, non-Maxwellian nature of distribution, temperature and density of trapped electrons moving with the SEHs, etc. We have measured the EEDF of SEHs for shorter and longer pulse widths compared to ion response time. To measure this EEDF, a disc Langmuir probe is used and the electron and ion currents are obtained for positive and negative bias to the probe respectively. From the $I-V$ characteristics of Langmuir probe, we can find the EEDF (first derivative) and the electron energy probability function (EEPF). In EEPF, the peak gives the trapped electron temperature and the area under the curve gives the density. In this way, we have measured the temperature and density of trapped electrons inside the SEHs. The distribution function is changed according to the number of trapped electrons. For both the pulse widths, the distribution function shows a bi-Maxwellian form.

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