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# P1.4012 Characteristics of uphill diffusion with low frequency fluctuation in dipole magnetic field

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See the full abstract here:
http://ocs.ciemat.es/EPS2019ABS/pdf/P1.4012.pdf

The Ring Trap 1 (RT-1) device creates a laboratory magnetosphere that is realized by a levitated superconducting ring magnet in vacuum [1]. The RT-1 experiment has demonstrated the self-organization of a plasma clump with a steep density gradient; a peaked density distribution is spontaneously created through 'uphill diffusion' [2, 3]. Understandings of particle transport are essential element of confinement physics in the high-performance plasmas. The main purpose of our study is to reveal particle transport characteristics in the RT-1 magnetospheric plasmas.
The dynamical process of the uphill particle transport has been analyzed by injecting tracer gas into helium plasmas. At t = 1.1 sec, the helium gas is puffed during 5 msec. For the spacial profile of electron density, the line-integrated electron densities measured in one horizontal (r =0.45 m) and two vertical (r = 0.62 and 0.70 m) chords are reconstructed by a model function of magnetic flux surfaces [3, 4]. The spacial profiles reveal that the increase in electron density is clearly appeared at r = 0.55 m after the gas injection from t = 1.1 sec to t = 1.4 sec. We observe simultaneous excitation of low frequency (about 1.0 kHz) fluctuations in both electron density and magnetic measurements. The low frequency fluctuations are localized in the peripheral region of the peaked density profile, which suggests the localized fluctuations drive the uphill diffusion. Furthermore, magnetic proves in a toroidal array show the spatiotemporal structure of the low frequency fluctuations in the direction of magnetic field line. The magnetic probe array identified that (1) the toroidal mode number of the fluctuation is m = 5 in the plasma whose local electron beta e = 0.02 0.18, (2) the phase velocity of the fluctuation is 1100 m/s in the electron diamagnetic direction, and (3) both the amplitude and the frequency of the fluctuation increase as the increase of the local e value. We will report the characteristics of uphill diffusion considering the simultaneous fluctuations in the dipole magnetic field.

References
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## pppo

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