JUMPs of THE ANODE LAYER IN THE ZONE OF THE E × B DISCHARGE

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Plasma accelerator with an anode layer (TAL), which is based on the *Е*× *В* discharge, is one of the main components of the plasma-optical mass separator [1]. The TAL theory (theoryof the *E*× *B* discharge) gives monotonic dependencies of the discharge parameters on the plasma-forming gas pressure and magnetic field [2]. Experiments, however, tell a different story.

Figure 1 shows an example of a sharp jump of the anode layer (AL) from the near-anode region (spectra 1 and 2) to the cathode (spectra 3–6 in the “cathode layer”) with increasing argon pressure from *P* = 12⋅10–5 Torr to *P* = 14⋅10–5 Torr. The density of ions *n* (the moment of the distribution function) undergoes a jump: *n*3/*n*2 ≈ 16.

**Fig. 1.** Evolution of the *Е*× *В*-discharge as the pressure of argon changes:
*U*p = 1160 V; *B* = 970 G: curve 1 *P* = 1⋅10–4 Torr;2 – 1.2⋅10–4; 3 – 1.4⋅10–4; 4 – 1.6⋅
10–4; 5 – 1.8⋅10–4; 6 – 2⋅10–4.

Along with this, the fact of a non-monotonic change in the position of the AL and the density of ions is reliably registered when the magnitude of the magnetic induction at the anode increases at constant pressure – fig. 2: the decrease in density is replaced when the field B ~ 700 Gs on its growth.

**Fig. 2.** Evolution of the *Е*×*В*-discharge in argon with a change in the magnetic field at the anode: *U*p = 1160 V; *Р* = 9⋅10–5 Torr; curve 1 – *B* = 100 G; 2 – 500; 3 – 970;
4 – 1070; 5 – 1140.

The report discusses the possible causes of these interesting events.

References

1. Bardakov V.M., Kichigin G.N., Strokin N.A., [Tech. Phys. Letters](http://link.springer.com/journal/11455), 2010, 36, 185.
2. Grishin S.D., Leskov L.V., Kozlov N.P. Plasma accelerators. Moscow: Mashinostroenie, 1983. 231 p.