Contribution ID: **317** Type: **Poster**

PLASMA FORMATION PROCESSES AT THE SURFACE OF THE DOUBLE-LAYER CONDUCTORS IN A FAST-RISING MEGAGAUSS MAGNETIC FIELDS

Tuesday 20 June 2017 13:30 (1h 30m)

Surface plasma formation processes in fast rising (≈ 100 ns) megagauss magnetic fields are interesting from the viewpoint of various applications. If the magnetic field penetration depth is lower than conductor thickness, the plasma formation should be attributed to so called skin or ultrafast electrical explosion. The dense plasma is formed due to Joule energy release when the magnetic field at the surface of the metal attains few megagauss [1, 2]. The problem of plasma formation on the surface of the conductor should be accounted in the design of multi-megaamphere pulse generators. The report presents the experimental data obtained on the pulse power MIG facility (the current amplitude up to 2.5 MA and rise time to 100 ns) in course of the investigations of the plasma formation at the surface of the cylindrical conductors. The aim of the experiments was to compare skin electrical explosion of homogeneous and double-layer conductors in magnetic fields up to 4 MG. The copper and aluminum conductors with diameters of 2 and 3 mm were used. Half of the each conductor had an additional layer with thickness up to hundred microns. The layer was made of titanium by vacuum-sputtering. A four frame optical camera HSFC-Pro with the frame duration of 3 ns was used to detect self-emission of the surface plasma. It was shown that titanium layer with thickness (20-80) microns provides significant delay of the plasma formation and instabilities development.
The work was partially supported by grants of the Russian foundation of the basic researches #16-32-00631 and #16-08-00658.
1. T. J. Awe, B. S. Bauer, S. Fuelling, R. E. Siemon, PRL, 2010. –V.104. –035001.
2. S. A. Chaikovsky, V. I. Oreshkin, I. M. Datsko, N. A. Labetskaya, D. V. Rybka, N. A. Ratakhin, Phys. Plasmas, 2015. –V.22. –112704.

Authors: CHAIKOVSKY, S. (Institute of Electrophysics UD RAS, Ekaterinburg, Russia); DATSKO, I (Institute of High Current Electronics SB RAS, Tomsk, Russia); RYBKA, D. (Institute of High Current Electronics SB RAS, Tomsk, Russia); BAKSHT, Rina (Institute of High Current Electronics); LABETSKAYA, Natalia (Institute of High Current Electronics SB RAS, Tomsk, Russia); Dr ORESHKIN, Vladimir (Institute of High Current Electronics SB RAS); ROUSSKIKH, Alexander (Institute of High Current Electronics); SHUGUROV, V. (Institute of Electrophysics UD RAS, Ekaterinburg, Russia); VANKEVICH, V

Presenter: BAKSHT, Rina (Institute of High Current Electronics)

Session Classification: Poster session II - High-Energy Density Physics and Technology

Track Classification: High-Energy Density Physics and Technology