[IV~3]

STUDY OF NON-MONOTONOUS EEDF IN LOW PRESSURE PLASMA SOURCES

Antonova T.B.*, Bougrov G.E.*, Bougrova A.I.**,Choi W.-K.***,
Gontcharov L.A.*,H.-J.Jung***, Koh S.-K.***, Kondranin S.G.***,
Kralkina E.A.*, Sitin E.S.*, Obukhov V.A.*

*RIAME MAI, Russia, 125871, GSP, Moscow A-80, Volokolamskoe shosse, 4.

**MIREA, Russia, 117457 Moscow, Vernadskogo prospect,78.

***Division of Ceramics, Korea Institute of Science and Technology, Cheongryang P.O. Box 134, Seoul, Korea

Gridded broad-beam ion sources and plasma accelerators have been used for ground and space technologies for more than 20 years and find wide applications in different fields of industry such as electric propulsion, microelectronics optics, etc. Nowadays plasma technologies require pure ion beams of inert and reactive gases obtained with minimal energy expenditures. One of the basic plasma parameters which determines both the rate of working gas ionization and energy expenditures for the discharge maintenance is electron energy distribution function (EEDF). The survey of the literature shows that many experimental data indicate the presence of group of fast electrons in the discharges of different type ion sources and plasma accelerator. The present report represents experimental investigations of EEDF in broad beam gridded ion sources with peripheral and divergent magnetic field as well as in the ion accelerator with closed electron drift aimed at the analysis of EEDF form in the range of energies corresponding to working gas ionization potential and higher. This task is known to be a complex one due to the increase of traditional probe measurements error in the range of high electron energies. In the present work for experimental investigation of EEDF in parallel with well-known "second derivative" method the mathematical processing of probe curves with the help of regularization method were used. The question of reliability and quality of revealing the EEDF structure was considered carefully.

Experimental investigations of EEDF shape in different plasma devices showed that the common feature of EEDF is the presence of group of fast electrons. The analysis of ionization and energy losses mechanism showed that the presence of secondary maxima of EEDF is of key importance for understanding of the physical nature of the processes in the ion sources and plasma accelerators.