SPAce DISTRIBUTION OF PLASMA PARTICLES FORMED BY ECR DISCHARGE IN A NARROW COAXIAL RESONATOR (COMPUTATIONAL EXPERIMENT) [[1]](#footnote-1)\*)

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The space distribution of plasma particles formed by an ECR discharge in a narrow coaxial cavity was studied using a three-dimensional computer simulation using the PIC method taking into account electrostatic interactions described in [1] and adapted to solve the present problem. The model takes into account all the main operating parameters of the plasma source: the configuration of the magnetic field, the structure and intensity of the microwave field. The solution of the Poisson equation was carried out by the method of fast Fourier transform. The plasma intrinsic magnetic field was not taken into account in the model, since for the parameters under consideration (density and average energy of the electron component) its influence on the processes occurring in the source is negligible. The equation of electron motion was solved according to the Boris scheme described in [2]. Modeled ions (argon) were considered unmagnetized and singly charged. The equation of motion of the ions was solved by the "leap-frog" scheme. At the initial time moment of the simulation, a neutral single-ionized low-temperature plasma (Te≤10eV) is simulated in the ECR regions of interactions, with the temperature of the ions not exceeding fractions of an electron-volt. The plasma density in the region of ECR interaction varied from *n* = 1010 cm-3 to *n* = 1012 cm-3. The calculations were carried out until the plasma parameters reached quasi-stationary values.

It was shown that in the central part of the resonator there is an excess concentration of ions, while at the periphery the concentration of electrons dominates. The obtained results allow us to begin work on the creation of a plasma injector, the acceleration of charged particles in which will be carried out in an electrodeless manner.

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References

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1. \*) [abstracts of this report in Russian](http://www.fpl.gpi.ru/Zvenigorod/XLVII/Lt/ru/FP-Azarova.docx) [↑](#footnote-ref-1)