Reflection of electromagnetic wave electron cyclotron region in fusion plasma [[1]](#footnote-1)\*)

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Chuvakin P.A., Gospodchikov E.D.

Institute of Applied Physics of the Russian Academy of Sciences , Nizhny Novgorod, Russia, chuvakin.pavel@mail.ru

Microwaves resonant interaction with hot magnetized plasma leads to violation of the WKB approximation. The most physically interesting phenomena caused by this violation is the reflection of the heating electromagnetic waves from an electron-cyclotron resonance region. Even if reflection does not significantly decrease the heat efficiency, but it possible effects Microwaves diagnostics in an experiment on heating thermonuclear plasma in a toroidal magnetic trap by powerful millimeter radiation.

 In this paper, the problem of reflection of an extraordinary wave propagating across the magnetic field from the resonance region at the second harmonic of the electron cyclotron frequency was considered. Such a problem is characterized by the combined effects of spatial dispersion and spatial inhomogeneity and by the linear interaction of electromagnetic and quasi-electrostatic waves [1]. Numerical full-wave solution of the problem was performed. In calculations the relativistic corrections for permittivity tensor [2] and correct boundary conditions [3] was considered. As a result, the distribution of the electromagnetic field in the near-resonance region and the dependence of the reflection coefficient on the parameters of the resonance region were found.

References

1. G.M. Batanov, V.D. Borzosekov, L.V. Kolik [et al.] // Plasma Physics Reports. 2013. Vol. 39, No. 11. P. 882-887.
2. A.S. Sakharov // Plasma Physics Reports. 2017. Vol. 43, No. 11. P. 1065-1071
3. Shalashov A.G., Gospodchikov E.D. // PHYSICS-USPEKHI. – 2011. – Vol. 54, No. 2. – P. 145-165
1. \*) [abstracts of this report in Russian](http://www.fpl.gpi.ru/Zvenigorod/L/Mu/ru/HT-Chuvakin.docx) [↑](#footnote-ref-1)