Investigation of the influence of plasma inhomogeneity on the absorption of an Alfen wave by a dissipative plasma with bremsstrahlung and photorecombination radiation taking into account [[1]](#footnote-1)\*)

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A mathematical model for the absorption of an Alfvén wave in a dissipative plasma, caused by dissipative effects (magnetic viscosity, hydrodynamic viscosities and thermal conductivities of electrons and ions, relaxation of electron and ion temperatures) and bremsstrahlung and photorecombination radiation, based on the equations of two-fluid electromagnetic hydrodynamics with full account of the inertia of electrons is investigated in the paper. The investigation is aimed at studying the possible mechanism of anomalous heating of the solar corona by Alfvén waves arising in the solar photosphere [1]. Earlier [2], when studying a homogeneous plasma, it was shown that an Alfvén wave penetrates into a dissipative plasma to a finite depth, and its parameters stabilize over time, reaching a quasi-steady regime. In the present work, the influence of spatial density nonuniformity on the absorption of the Alfvén wave is investigated. We assume that the dissipative plasma fills the half-space, on the left boundary of which the Alfvén wave runs. Further propagation of the wave is associated with its absorption, which is the subject of study. The main types of heterogeneity are investigated: top and bottom. By alternating inhomogeneities of the top and bottom type, any spatial inhomogeneity of the plasma in terms of density can be obtained. The dependences on the value of the top of the depth of penetration of the Alfvén wave into an inhomogeneous plasma and the maximum temperatures of electrons and ions are obtained. The study showed that an increase in the amplitude of the incident wave leads to an increase in the values of the maximum temperatures of electrons and ions, as well as an increase in the depth of penetration of the Alfvén wave into an inhomogeneous dissipative plasma.

References

1. Scott W. McIntosh, Bart Pe Pontien, Marts Carlsson, Viggo Hansteen, Paul Boerner & Marsel Goossens. Alfvenic waves with sufficient energy to power the quiet solar corona and fast solar wind // Nature, 2011, v.475, p.478-480.
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1. \*) [abstracts of this report in Russian](http://www.fpl.gpi.ru/Zvenigorod/L/Lt/ru/FB-Tayurskiy.docx) [↑](#footnote-ref-1)