

On ponderomotive acceleration of heavy ions in magnetospheric plasma

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The problem of ponderomotive separation and acceleration of ions with different charge-to-mass ratios under the influence of Alfvén waves, which permanently exist in the magnetosphere in the form of geomagnetic pulsations, is posed. Formulas are derived for partial ponderomotive forces acting on light and heavy (metal) ions. In the quasi-hydrodynamic approximation, a system of equations is obtained that describes the distribution of ions along magnetic field lines in the Earth's magnetosphere. It was found that the Clarke number, which characterizes the metallicity of the plasma, is maximum at the minimum of the magnetic field on the field line along which the Alfvén wave propagates. The possibility of applying the theory to the analysis of mass spectrometric changes in the chemical composition of space plasma is indicated.

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