



Alfvén wave parallel electric field in the dipole model of the magnetosphere

Danila Kostarev, Pavel Mager, and Dmitri Klimushkin

INSTITUTE OF SOLAR-TERRESTRIAL PHYSICS, Irkutsk, Russian Federation (kostarev@iszf.irk.ru)

We suggest a mechanism for the generation of Alfvén wave parallel electric field in a curved magnetic field with a trapped particles. The coupling with the compressional mode due to the magnetic field non-uniformity and finite plasma pressure provides the parallel magnetic field of Alfvén wave. Further, the compressional and Alfvén modes acquire the parallel electric field due to coupling with the electrostatic mode as required by the quasi-neutrality condition in kinetics. The parallel electric field acquired by the suggested mechanism is considerably larger than that due to the coupling between the Alfvén and electrostatic modes in homogeneous plasmas. The parallel electric field is described by an integral equation arising from the averaging of the bounce-motion of electrons. This equation is solved in the dipole model of the magnetosphere and the longitudinal structure of the parallel electric field is obtained. The work was supported by the Russian Science Foundation under grant 18-17-00021.