



Inertial Alfvén and electromagnetic waves generation in space dust plasma

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The physical processes in dusty plasmas have been studied intensively because of their importance for a number of applications in space and laboratory plasmas. Generally, dust particles in plasma are charged by plasma current, photoemission, secondary emission, etc. The presence of charges, on dust particles are, strong for low frequency waves. In this paper we propose a nonlinear mechanism of inertial Alfvén and electromagnetic waves in space dust plasma. Parametric instability of pump upper-hybrid wave is considered as the generation mechanism. Due to this instability the pump upper-hybrid wave decays into electromagnetic waves (propagating along/across the ambient magnetic field) and inertial Alfvén wave. A nonlinear dispersion relation describing three-wave interaction and instability growth rate is deduced from the three-fluid magnetohydrodynamics equations. It is shown that the generation of left-polarized electromagnetic wave is more effective than the generation of ordinary one. This nonlinear process under consideration can take place in the Earth's magnetosphere, cometary tails, planetary rings.