

# Manifestations of modulational instability in Earth's dusty ionosphere

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Development of modulational instability involving dust acoustic perturbations in dusty ionospheric plasma and in dusty plasmas of meteor tails in Earth's ionosphere was considered. The effect of collisions of electrons, ions, and dust grains with neutrals at different altitudes was estimated. It is shown that, in this case, the influence of collisions of electrons and ions with neutrals is usually less significant than the influence of collisions between dust grains and neutrals. It is demonstrated that the effect of the modulational instability on the propagation of electromagnetic waves in the dusty ionospheric plasma is the most significant at altitudes of 100–120 km. The values of the wave vectors of the electromagnetic pump wave at which inelastic collisions with neutrals are important for the development of modulational interaction are calculated. The modulational interaction in the dusty ionosphere is important for the explanation of different phenomena. The absence of observations of low-frequency ionospheric radio noise during such phenomena as noctilucent clouds and polar mesosphere summer echoes caused by the presence of dusty plasmas at altitudes of 80–95 km is explained by suppression of the development of the modulational instability at these altitudes. The role of inelastic collisions with neutrals in meteor tails is also discussed. It is shown, that for typical parameters of dusty plasmas of meteor tails such collisions do not influence on the development of the modulation instability in meteor tails.