

# Trigger activation of perturbation of the ionosphere plasma under optical excitation of the neutral component of the medium

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The «North Star» active ionospheric experiment showed that a small addition of neutral air to the ambient ionospheric plasmas can significantly modify the results of the plasma jet injection experiment. Instead of fast cooling of the jet, condensation and recombination of aluminum atoms in it, the presence of a neutral artificially created air cloud led to an increase in the level of ionization by about two orders of magnitude, a significant distortion of the magnetic field with the formation of a cavity, etc. It is difficult to explain these features by collisional ionization or photoionization of the air components in collisions with accelerated ions. In this case, under the action of a flash of ultraviolet and optical radiation, accompanying the injection of plasma, the vibrational excitation of neutral air occurs. With the resonant interaction of the neutral and charged components of the medium, the energy accumulated in vibrational excitation can lead to an increase in the wave motion of ions and neutrals, the appearance of electron acceleration, a further increase in the level of excitation of neutrals. It is shown that these processes lead to a decrease in the effective thresholds of both ionization and charge exchange reactions. The paper considers the effect of such a mechanism on increasing ionization and activation of charge exchange processes. It is shown that the considered mechanism can be the main mechanism responsible for maintaining a high degree of ionization of the plasma jet. Possible processes of interaction of a medium excited by a given mechanism with fluxes of super-thermal electrons, a change in the mode of evolution of a plasma cloud in the presence of this interaction are considered. An estimate of the energy and lifetime of this mechanism is also given.