Response of the unstable near-equatorial plasma in the F region of the ionosphere to the spatial packet of atmospheric gravity waves (AGW) of the lithospheric origin

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We propose that the observed [1] seismogenic excitations of plasma concentration in the equatorial F-region of the ionosphere after strong earthquakes could be connected with the resonant excitation of the AGW by the lithospheric source and subsequent development of the Rayleigh-Taylor instability (RTI). In distinction to the known theory of RTI, we took into account the driving force for the RTI connected not only with vertical, but also with horizontal component of the AGW velocity; the driving force connected with the horizontal velocity component exceeds the other components of the driving force. Development of plasma instability in the presence of not a single harmonic AGW, but of a wave packet excited by the lithospheric source is searched. Results of calculations correspond qualitatively to the main features of observed structures in near-equatorial plasma after strong earthquakes. (1) Regions of plasma perturbations are shifted for few thousand kilometres to the west relatively to the regions of maximum of AGW field in the presence of the east wind. (2) Periodicity with typical period $\sim$ 800 km is observed both in neutral and plasma perturbations. (3) Regions of plasma perturbations are localized and have typical dimensions of order of 1000 km. (4) Relative change of plasma concentration could reach a value of order of 60-80%, which proves the presence of plasma instability in the observed processes.

[1] Fedorenko A.K., Lizunov G.V. Proceed. 4th. Ukr. Conf. on Perspective Space Researches. – Ponizovka, Crimea, Ukraine, 19-26 Sept. 2004, P.54.