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Transient growth of IGW in the ionosphere with non-uniform shear winds

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Linear mechanism of intensification and transient growth of internal gravity waves (IGW) at smoothly stratified dissipative ionosphere at interaction with non-uniform zonal winds (shear flows) is studied. It is shown that amplification of IGW with respect to time is not flowing exponentially, but in algebraic power law manner. Frequency and wave number of the generated IGW modes are functions of time. So, in the ionosphere with shear flows due to linear mechanism, when the nonlinear and turbulent effects are absent, the wide spectra of wave perturbations will generate. Effectiveness of the IGW amplification mechanism is analyzed at interaction with the zonal winds. It is shown, that at the initial stage of evolution IGW perturbations effectively extract energy from the shear flows sufficiently increasing own amplitude and energy (almost by an order). Energy exchange process between the shear flows and the wave perturbations is based on the "lift-up" mechanism, according to which the perturbations carry the liquid from the high velocity region to the lower ones and vise versa. Energy exchange between the spatial Fourier harmonics as intensive, as faster moves the liquid particle along the shear flow. The value of the threshold velocities for compressible and incompressible wave perturbations is estimated. Numerical simulations are carried out and phenomenon of the mutual transformation of the wave modes is revealed.