

# ANALYTIC AND NUMERICAL SOLUTIONS OF ATMOSPHERIC GRAVITY WAVES EVOLVING IN HORIZONTAL SHEAR FLOW

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## *Abstract*

The evolution of atmospheric gravity waves (AGW) in unbounded horizontal winds with constant shear is developed for the three-dimensional case. The atmosphere is considered to be isothermally stratified and the wind shear lies in the horizontal plane. Time varying frequencies of the AGW, which for large times tend to the isothermal Brunt-Väisälä frequency is obtained. The excitation of vortical perturbations located in the horizontal plane – shear waves, is shown. The time variation of AGW frequencies, the existence of shear wave and their amplitudes amplification/damping are due to the presence of the horizontal shear flow. The horizontal shear flow as a possible source of formation of large scale travelling ionospheric disturbances (TIDs) with small period ( $16 - 19min$ ) is considered. The different pictures of evolution of the AGW like initial perturbation are obtained in vertical, horizontal winds and its shear directions. The importance of coupling between the gravity and shear waves in the horizontal shear flow is shown. The possibility of transformation of the shear waves into the AGWs is demonstrated.

*Key words and phrases:* Hydrodynamic Equations; Atmospheric Gravity Waves; Shear Flow.

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