

Propagation of wideband and shock waves induced by seismic activity in the stratified atmosphere

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Keywords: *shock waves, stratification, seismic activity, sound generation*

Interdisciplinary study of flows of matter and energy in geospheres has become one of the most significant advances in Earth sciences. The actual contribution is the interdisciplinary study of nonlinear acoustics and physical seismology dedicated to wideband and shock wave propagation in the stratified and viscous atmosphere. Seismic activity in Earth's crust induces different process in all geospheres, and one of these processes is the generation of acoustic waves in the atmosphere. Such phenomenon influences on the atmosphere state and can become one of methods of prediction of large seismic events. The main factors to be considered are the stratification of the atmosphere, its viscous and nonlinear effects. Nature origin waves usually have wideband and even shock profiles, so the nonlinear wave equation and evolution equation for such waves are set up. There are obtained the asymptotic profiles for wideband waves, peak waves and durations for simple shock waves. The shock waves propagation through nonperturbed medium is investigated and the sound of its propagation is obtained from the exact solution of generalized Burgers' equation. The heat rate of the atmosphere due to the shock wave propagation is estimated. The efficiency of acoustic streaming induced by shock wave propagation is investigated.