tion of statistical summation. As a result amplitude spectra are reinforced and complicated by deflections. The signal, depicted in Fig. 3 does not have this deficiency and looks as a "classical" elementary signal. It can be used for processing of fact materials by the method of phase de-convolution.

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The atmosphere heating due to wideband acoustic and shock waves propagating

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Lomonosov's Moscow State University, Moscow, Russia
vgusev@bk.ru

Acoustics waves propagating in the stratified atmosphere influence on its state. One of such mechanisms is the heating of atmosphere due to wave dissipation. It is well known [Golicyn, Romanova, 1968; Romanova, 1970] that the stratification of the atmosphere leads to some important effects associated with acoustics wave propagation. First of all is the exponential increase of velocity of particle of medium. It's mean that the nonlinear effects must be taken in account. The second effect is the significant increase of effective coefficient of dissipation. In addition, nonlinearity leads to formation of shock waves with narrow shock front. Finally the wave dissipation and corresponding energy flow is more significant in stratified atmosphere.

Acoustic waves are the important mechanism of interaction between different geospheres. Waves generated due to seismic activity and earthquakes influence on the atmosphere state. This phenomenon is important for prediction of long distance wave propagation, weather forecast and so on. Another application is the investigation of seismic activity themselves and prediction of strong seismic events [Gusev, Sobisevitch, 2010].

For wave profiles in stratified atmosphere the analytical solutions at large heights were obtained :
for periodical initial sinusoidal signal

$$V_S = \frac{1}{1+s}\left(-\theta + \pi\tanh\left[\frac{\pi}{4\Gamma(1+s)}\left(1+\sqrt{1+\frac{8\Gamma(1+s)^2}{\pi^2 s_0}}\right)\frac{\theta}{1+s/s_0}\right]\right),\quad -\pi<\theta<\pi,$$

where the term with hyperbolic tan describes the shock front; and for positive phase of single *N*-shaped impulse

$$V_N = -\frac{\theta}{1+s} + \frac{1}{2\sqrt{1+s}}\left(1+\tanh\left[\frac{1}{4\Gamma\sqrt{1+s}}\left(1+\sqrt{1+\frac{8\Gamma(1+s)}{s_0}}\right)\frac{\theta+\sqrt{1+s}}{1+s/s_0}\right]\right),\quad -\sqrt{1+s}<\theta<0\,.$$

Here $\theta = t - x/c_0$ is the retarded time, $s = \frac{2H}{z_{nl}}\int_0^x e^{x/2H}dx = 2H\left(e^{x/2H}-1\right)$ is the effective distance, x —

height, Γ— coefficient of dissipation, $s_0 = \dfrac{2H}{z_{nl}}$, H is the standard atmosphere.

Using these expressions one can compute the heating atmosphere rate in accordance with equation

$$c_p \rho_0 \frac{\partial T}{\partial t} = -\frac{\partial}{\partial x} cE \, .$$

Here E is full energy of acoustical impulse

$$E = \rho_0 \int_{-T(z)}^{T(z)} u^2(\theta, z) d\theta \, .$$

This equation shows that temperature changing goes due to change of the energy flow. Taking into account that $\rho_0 = \rho_{00} e^{-x/H}$, $T(z) = T_0\sqrt{1+s}$, one can obtain:

$$E = \frac{2\rho_{00} u_0^2 T_0^3}{3\sqrt{1+s_0\left(e^{x/2H}-1\right)}} \to \frac{2\rho_{00} u_0^2 T_0^3}{3\sqrt{s_0}} e^{-x/4H} \, .$$

Consequently the temperature increasing rate is

$$\frac{\partial T}{\partial t} = \frac{c u_0^2 T_0^3}{3c_p} \frac{s_0}{2H} \frac{e^{3x/2H}}{\left(1+s_0\left(e^{x/2H}-1\right)\right)^{3/2}} \to \frac{\rho_{00} c u_0^2 T_0^3}{3c_p \rho_0} \frac{1}{2H\sqrt{s_0}} e^{3x/4H} \, .$$

Thereby at large heights the significant temperature increasing takes place due to stratification and density decreasing. This phenomena radically differs from the influence of periodical signal, the amplitude of which reaches the saturation at large heights, so the temperature increasing rate due to periodical signal is almost independent on height.

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Accurate deteriminations of vibrational and radiative thermal transport in perovkite, rocksalt, and related structures

© *A. Hofmeister, 2010*

Department of Earth and Planetary Sciences, Washington University, Missouri, USA
hofmeist@levee.wustl.edu

That thermal diffusivity is connected with cooling front speed has gone unrecognized until recently [Hofmeister, 2010]. Consequently, ballistic radiative transport affecting virtually all measurements inten-