Physical effects, properties and patterns in acoustics

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February 2019, St. Petersburg

FOREWORD

The discovery of previously unknown, but objectively existing patterns, properties, and physical effects (phenomena) of the material world falls under the concept of discovery. The discovery reveals what has always existed, but it was not known before.

The development of any field of physics should begin with the discovery of a physical effect, property, or regularity that can be observed by experiment (measurements). Only in this case, that is, in the presence of an experimental basis, can the physical effect serve as a support for building a complex of new knowledge.

In many cases, discovery leads to the need to change the paradigm, that is, it forces one to radically change the point of view of a whole area of knowledge, and thus make a breakthrough in the process of cognition [1].

Unfortunately, in practice it often happens that the basis of some field of knowledge uses a physical effect, which is not observed in the experiment, but seems like some obviousness, which is given by the property of axiom. Such cases develop towards delusion instead of science, and that is how they are noted in the history of physics. This, for example, the hypothesis of the world ether, etc.

E.g., such a case was the development of seismic prospecting, which is considered the most informative geophysical method, but it does not have a single footing that could be proved experimentally.

Often, such errors (and, in general, hypotheses) are called theories. But theory, by definition, is a hypothesis proven by practice. There is no practice here, and having emerged as hypotheses, these trends do not turn into theory.

In addition, often there are trends in science that remain untested hypotheses, but, nevertheless, for reasons of personal gain, they are given the status of theories, despite the fact that they are not. These are, for example, the doctrine of stress state of rocks, a doctrine based on the allegedly confirmed experimentally memory effect in rocks, a doctrine based on the allegedly confirmed nonlinearity effect during seismic prospecting. There are many such areas. They can be attributed to the pseudoscience, and they have one common feature. They cannot be confirmed by measurements consistent with the principles of metrology.

As a rule, such directions are created solely for the purpose of personal gain. I even feel sorry for these people. They push themselves into a corner, and live in fear of exposure. And the degrees and titles for which they are doing this are tinsel, which collapses as soon as it becomes known that these, as it were, great scientists are just ordinary crooks.

But in general, there is a clear distinction between really existing and invented effects (properties and laws). The real effect is impossible to come up with. The real effect is always unexpected and always undesirable for the person who discovered it. I know cases when scientists who discovered a new effect destroyed information about it.

Understanding the true meaning of the actual effect comes, as a rule, not immediately after its detection. The fact is that everything we think about, everything that we can imagine, fits into the models that are already embedded in our brain as a result of our life experience.

Models of newly discovered, previously unknown effects in brain are absent. Science fiction writers cannot invent them; they are perceived by students with enormous difficulty. If at all perceived.

I more than 40 years talk about elastic oscillatory systems, but for so many years I have not met a single person who could perceive it. Of course, with the exception of radio operators who know about electric oscillatory systems.

In contrast to the real, invented physical effects have their own prototypes and are perceived without difficulty.

For example, 40 years ago I learned that when an impact has energy of the order of an atomic explosion is possible, the appearance of nonlinear effects in the field of elastic oscillations is possible. Then I accidentally had a conversation with one employee of the Institute of Physics of the Earth , who told me that he was engaged in the theory of nonlinear effects in the field of elastic oscillations.

I, being unsophisticated in palace intrigues, expressed doubt about the truth of his statement. First, any theory should be supported by experiment, but is there an experimental basis for theorizing on this topic? And secondly, a nonlinear phenomenon is not a phenomenon that is described by a nonlinear equation, but one that has a nonlinear pass characteristic (for example, like transistors) ...

My doubt about the reality of non-linear effects in acoustics apparently caused severe heartburn from this great boss, and with serious consequences for me to this day. And what is there to be offended by something! Nonlinearity in acoustics is either there, or it does not exist, and it is necessary to respond to this question not with insults, but with experiments. But he, poor fellow, still can not forgive me for giving out his scam.

At about the same time, a certain gentleman from the Moscow Mining Institute informed me that he was working on a memory effect in rocks. This effect, like the non-linearity effect, has long been the master of the minds of scientists, and for this reason alone there is doubt about its reality. Again, this man was offended at me, because I asked to show this effect. But,

brothers, we can only believe in God, and everything else should be checked and not be offended.

My department chair is no longer in the world, but if he is remembered, then as an outstanding cheater who was known as a man who allegedly created mining science. Prior to this, mining was called mountain art, since the main thing here was the experience of the miners. As he himself said, he introduced mathematics into mining, and it turned into a mining science. And in fact, he came up with such a calculation of fastening underground workings, with which you can go to fastening , which is already in stock. And at each mine there is a department where people are engaged in juggling with coefficients, so that it turns out that the fastening was chosen as a result by the calculation.

And the head of the neighboring department is remembered as a man who managed to sell the idea of an eternal generator of heat to Brezhnev himself to provide our not very happy state with free warmth. And they all lived in fear that someone would know what their high scientificity.

All the physical effects, properties and patterns mentioned in this article were discovered during an experimental study of the field of elastic oscillations and can be presented at any time.

The article is divided into two parts. The first part is preparatory. It contains information about the properties of the elastic field.

The second part contains information on the methods and results of using the properties of the field of elastic oscillations described in the 1st part.

PART I

I-1. COMMENTS ON THE PRINCIPLES OF METROLOGY.

Measurement is a comparison with a standard. Metrology is always in a state of development, and if a certain area of knowledge today does not have its own reference in the chamber of weights and measures, this means that this area of knowledge is not yet within the competence of metrology, and it must be understood so that no measurements in this area of knowledge are possible.

For example, the stress state of rocks and rock pressure (which is the same thing) do not have their own standard. But this does not prevent this substance from being the most popular when considering all aspects of mining science.

This does not prevent almost all modern scientists in the field of mining science from pretending that they are engaged in research and measurement of the stress state.

The result of this, excuse me, "scientific direction" is that over the past 50 years, this area of knowledge has not taken a single step in the direction of knowing any problems in mining.

I – 2 FROM HISTORY OF SEISMIC

Acoustics as a field of knowledge originated in prehistoric times. Well it is clear. After all, we ourselves are a complete acoustic installation. Acoustic emitter - this is our vocal cords. Acoustic receiver - our ears. Therefore, the first application of acoustics - (after speeching) is music, musical instruments.

Each musical instrument is a set of oscillatory systems. The oscillatory system, as defined by Lord Kelvin (William Thomson 1824-1907), is an object that responds to a pulsed (shock) effect with a damped harmonic signal. So, each note is characterized by its own frequency, and any musical instrument is a source of harmonic (sinusoidal) signals.

Why exactly sinusoidal ones? ... The fact is that one of the seismic survey positions states that a signal of any shape can be obtained by interfering with several simpler signals. Yes, indeed, it is, of any shape, but with the exception of a sinusoid. A sinusoid is an elementary information block that cannot be obtained by any processing of simpler signals. Because there are no simpler signals than a sine wave.

To receive a sinusoidal signal, it is necessary to have an oscillatory system, and there is no other way. Or in other words, if there is a sinusoid, then there is an oscillatory system that created this sinusoid.

The general characteristic of acoustics as a subject is analogies with other physical fields. With optics, radio engineering ... Hydroacoustics is an analogy with sorts of radars. With the capabilities of various marine animals and bats. It would be strange if people didn't have an idea to use acoustics or, in other words, a field of elastic oscillations for sounding the earth's depths.

At the very beginning of the twentieth century, the opinion arose that acoustics had completed its development.

As the history of physics shows, every time there is a certainty that knowledge of a particular field of knowledge is completed, arises information according to which this area requires not just further study of the subject, but revising it from scratch, and changing paradigm. The reason for this is that knowledge is infinite, and there is no such area of knowledge that would finish its knowledge.

For example, the science of electricity in the 70s of the XIX century was declared complete in its development. Literally immediately after this, the discovery of the electric oscillatory system (oscillating L-C circuit) occurred, and electrodynamics immediately began to develop, in which the already created knowledge of electricity turned out to be only an insignificant special case.

I was very interested when I discovered that this rule applies and to me. It happens that after writing an article or book, it starts to seem to me that I have reached the limit set for me destiny, and I will not go further. And every time after that, I have a thought, as a rule, the thought that I missed something very important. It happens that even a new effect. As a result, i have to write a new article or book...

However, a new article or book must contain what was contained in the previous work, otherwise it will be incomprehensible. Therefore, it seems to everyone that I am writing the same thing.

I – 3 POISSON'S TESTAMENT

In 1829 in Paris, in the Proceedings of the Paris Academy of Sciences, Poisson's article appeared on the application of the wave equation to describe the propagation of elastic waves in solid media. This article turned out to be fundamental for describing the acoustics of solid media and its main direction - seismic exploration. Solving the wave equation for two boundary conditions, Poisson obtained expressions for describing longitudinal and transverse elastic oscillations. The mathematical apparatus created by Poisson formed the basis of the so-called ray beam seismic survey.

Shortly before his death, Poisson released a two-volume work of theoretical mechanics. To the surprise of his contemporaries, this two-volume work did not contain his work on the field of elastic oscillations.

Poisson explained it in such a way that the material placed in the two-volume book was tested experimentally, and therefore can be called a theory. As for the field of elastic oscillations, insofar as there is no equipment with the help of which verification, this material is purely hypothetical. But when the equipment appear and confirm what Poisson suggested, then this work can be called theoretical.

The wave equation proposed by Poisson has a solution only if the boundary conditions can be determined. And because the boundary conditions cannot be revealed, then the longitudinal and transverse elastic oscillations proposed by him are hypothetical.

Unfortunately, after Poisson left his life, these principles were forgotten, and his hypothesis was called theory. Mathematicians who were engaged in the development of his heritage, began to call themselves theorists, and began to consider longitudinal and transverse elastic waves as real.

First, Lord Rayleigh wrote an equation for surface waves, which were named after him. In the future, many mathematicians continued the list of types of elastic oscillations, none of which can really be identified.

This story continues to this day. Each type of elastic oscillations is characterized by a specific trajectory of particles oscillating in an elastic wave and its velocity of propagation. But it is impossible to determine this trajectory and this speed in the same way as to reveal any type of elastic oscillations. And so far it is not possible to answer the question of what particles oscillating are in an elastic wave.

But here came the twentieth century, there were opportunities for creating acoustic equipment, and the first seismic stations appeared. The first cases of the use of seismic stations did not inspire optimism. The field of elastic oscillations appearing upon impact or explosion on the surface of the earth's thickness did not provide a required echo signal.

The response to the impact had the appearance, at best, of some incomprehensible oscillatory processes. That's when came to the rescue word interference. When instead of a single response comes the oscillatory process, then the interference can be blamed for this, and this will not cause any doubts and objections to anyone. Well, in fact, because if the Earth's stratum is (by acoustic properties) a set of reflecting boundaries, then the set of reflected signals can interfere with any oscillatory process. But very much these echoes turned out to be nothing similar, and it was not possible to catch some geological sense there. People needed a source of geological information, but it was not.

Maybe the first seismic stations were really not good enough. And in order to improve the seismic stations, it needed money. And in order to have money, it is necessary that as a result of the use of already existing seismic stations, at least some positive information will appear. And so she appeared.

In 1909, it was reported that the professor at the University of Zagreb, Andrei Mokhorovic, received a lot of information using a seismic station. As well as information that the border between the crust and the mantle (which has since been called the border of Mokhorovichich) is at a depth of 5 to 70 km. This is all on the Internet. But it is inconvenient for me to rewrite it here, because now, 100 years later, it is clear that such information cannot be obtained using seismic prospecting.

From today's standpoint, it is clear that this entire set of statements seems highly unreliable. To get this information even today is impossible.

In general, subsequent scientists, and in particular, Gurvich I.I. [2] believe that the first seismic exploration work falls on the 30s.

Around the same time, the development of methods began, allowing, in the complete absence of information from the use of seismic prospecting, to pretend that this information exists. These methods boil down to the fact that before seismic exploration work, drilling is carried out, and with the help of various mathematical manipulations, the seismic section is "pulled" to the section obtained during drilling.

This is exactly what they did when opening the first Tyumen oil [3]. I learned about it by chance. I was told this by the geophysicists themselves, who got the laurels of the discoverers of this field. They claim that no seismic surveyor will ever agree to work without a well passport. When they saw that I didn't believe it, they recommended that I myself try to order a seismic survey without prior drilling.

We did so, and as a result of participating in several conferences and negotiations with almost all major geophysical firms (both Russian and foreign), we were forced to admit that the discoverers of Tyumen oil were right. Later, we obtained evidence that in the entire history of geophysics there was not a single case of seismic section coinciding with the geological section obtained as a result of drilling.

And even more than that, not a single seismic surveyor in the World will agree to carry out their research if it is not provided with a passport of a well drilled in a given place. Thus, it

became clear that the traditional (ray) seismic survey method is dependent, and without drilling does not provide information.

However, despite this, the number of dissertations confirming the high efficiency of seismic prospecting grew and grows at a fast pace, and the people who defended them have no choice but to remain the advocates of ray seismic exploration for the rest of their lives. I have already said that it is impossible to take back its word in science.

I – 4 Physical effect №1. The EOS

In 1977, as a result of acoustic measurements carried out in a coal mine, the rock layer was found to be an elastic oscillatory system (EOS) in terms of acoustic properties, and the earthly layers as a whole are a set of oscillatory systems, and not a set of reflecting boundaries (according to seismics affirmation).

In order to detect EOS, it was necessary that a number of coincidences occurred at the measurement site and during the measurement.

First, this effect could be detected only by a person who knows the Section of mathematics "spectral-time transformations". This section of mathematics is read, as far as I understand, only for students-future radio operators.

This physical effect itself seemed incredible to me. Normal rock layer, and suddenly - an oscillatory system ...

Such is the fate of most discoveries that their meaning, physics, and value are realized only many years after their discovery. The physical effect just discovered is as helpless and fragile as any newborn creature. And the main danger to its existence is its author.

Sic, Lord Kelvin, who discovered the electric oscillating circuit (100 years before the discovery of the EOS), immediately declared that this was his most insignificant discovery. And he did everything he could to prevent his research.

I was not so ruthless with the elastic oscillatory system, because I had a radio engineering background, I knew the history of the discovery of the electric oscillating circuit, and because the opening process of the EOS was remarkably similar to the process of opening the oscillating circuit. In addition, the EOS has a lot in common with the oscillatory circuit. Well, and in addition, this effect was the key to solving the problem of predicting the collapse of roof rocks.

My very descent into the mine and the creation of special equipment for measurements in the mine suggested that with the help of this equipment an attempt would be made to develop a method for predicting the collapse of the roof rocks of the coal seam. That was the task I received. But the fact that at the same time a new physical effect would be discovered was not expected, of course, by anyone.

It was assumed that if we manage to measure the attenuation of sound in the rocks, then we will be able to obtain a criterion for the probability of the collapse of these. It was obvious to everyone around me, including me, that the probability of collapsing roof rocks should be related to the level of its fracturing. And the same firm confidence was that the level of fracturing of the roof rocks should be related to the magnitude of the damping of the field of elastic oscillations in the roof rocks.

But in preparing the equipment for measuring the attenuation of the field, the question arose of what frequency should be used for measuring attenuation in the roof rocks. So it was decided to make these measurements in two stages. At the first stage, it was supposed find the dependence of attenuation on frequency, and only at the second stage - to investigate the attenuation itself at the selected frequency.

However, the second stage was not needed, since the obtained frequency dependence of attenuation clearly showed that the rock layer in terms of acoustic characteristics is an oscillatory system. On figure 1 shows this frequency dependence.

It is clear that before any research is coming a hypothesis. It was assumed that the attenuation of the sound with increasing frequency of the probing signal increases. That is, the

dependence of the amplitude of the field of elastic oscillations ***I*** on the frequency was assumed to be geometrically similar to the graph ***a***) in Fig.1.

The fact that this dependence actually turned out to be geometrically similar to the graphics ***b***) was a complete surprise.

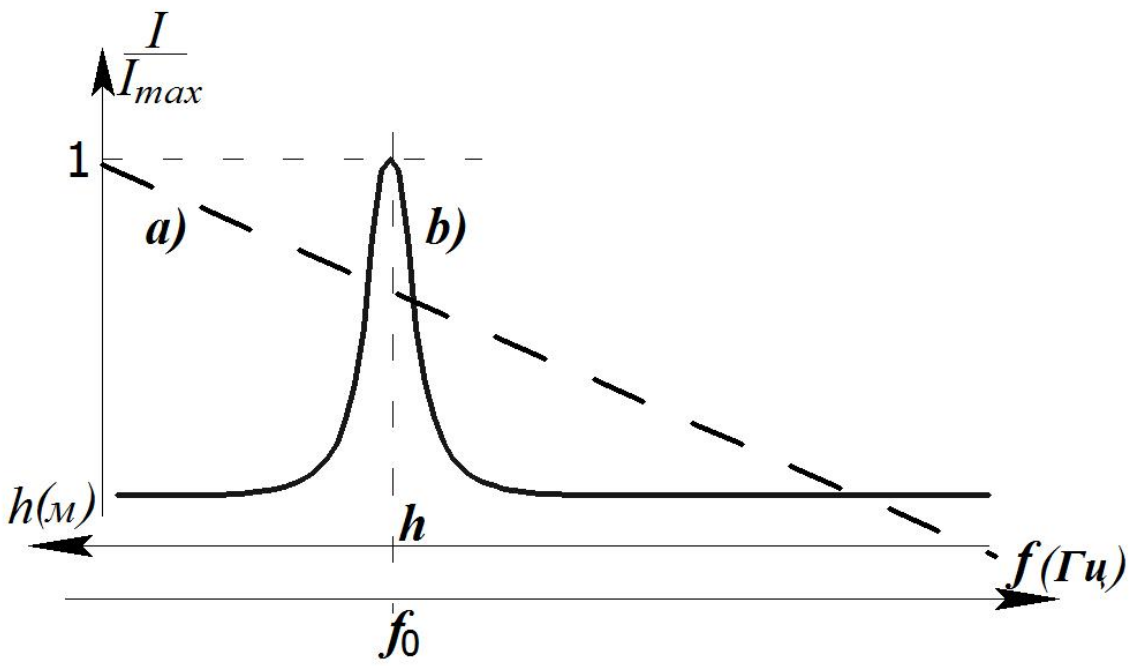

Fig 1

The fact is that this kind of frequency dependence means that the object under study (in this case, the rock layer) is an oscillatory system in terms of its acoustic properties.

When in higher education institutions pass the section “electric oscillatory systems” (oscillating circuit), they study the section of mathematics “spectral-time transformations”, according to which the frequency-dependent graph, geometrically similar to graph b) in Fig. 1, is nothing else than a spectral image fading away sinusoidal signal [4]. But it is known that If the frequency spectrum of the pass characteristics of any device is geometrically similar to the spectral image of a harmonic (that is, sinusoidal) damped signal, therefore, this device is an oscillatory system.

But how to explain that the graph b) in Figure 1, obtained by sounding the rock layer, is evidence that this rock layer is an oscillatory system ?!

In theory, only what radiates our piezoceramic radiating device should spread along the rock layer. And at the beginning of the frequency range it so happens. But as the frequency of the emitted signal approaches a certain frequency f_0, the amplitude of the signal that the receiver registers increases. When the frequency of signal is exceeded f_0, the signal amplitude decreases. This is because occurs at frequency f_0 there is resonance. Resonance is a phenomenon that occurs when the frequency of the external influence coincides with the natural frequency of the oscillatory system, which is affected by the external oscillatory process.

In order for an object to have its own frequency, it must be an oscillatory system. When we pronounce the word "resonance", we thereby recognize that there is an oscillating system. Because only an oscillating system can increase the original signal at some frequency.

On the basis of measurements in the conditions of the mines, it turned out that the thickness of the rock layer h and its natural frequency f_0 are related between themselves by the following relation:

$$f_0=2500/h \text{ or } h=2500/f_0 \quad (1)$$

Here 2500 is the coefficient with the dimension of speed. It took more than 40 years to understand what kind of speed.

The fact is that, as it turned out, the value of this coefficient is the same for all rocks, and this categorically contradicts the basics of seismic exploration, according to which each rock has its own value of the velocity of propagation of elastic vibrations.

Fig. 2 gives an idea that any time-varying signal can be represented both in the temporal (Fig. 2a) and spectral (Fig. 2b) form using the example of a harmonic decaying signal. Fig. 2

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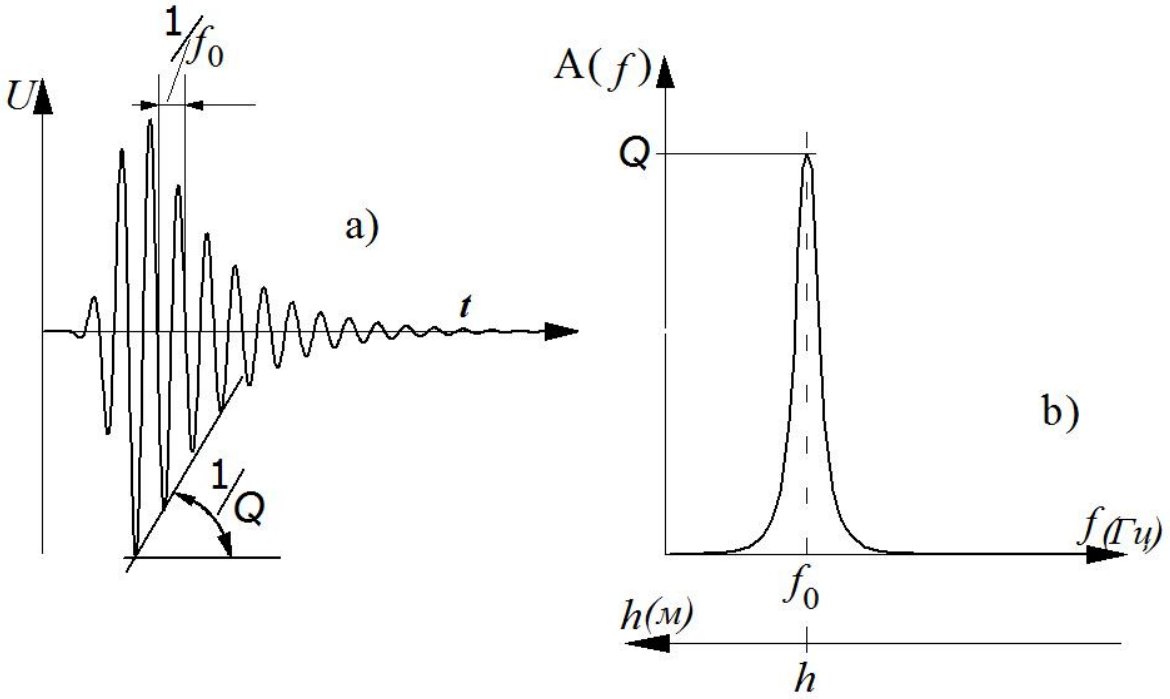

Fig. 2

When studying the L-C contours, it is more convenient to use a temporary image (Fig. 2a), and when describing EOS - spectral (Fig. 2b). In the case of a single oscillatory system, both of these approaches are equally informative and are, as it were, synonymous. However, EOS is rarely single, and then the time image will lose information, as the neighboring (in frequency) oscillatory systems will merge.

Such a simple recalculation of f to h allows spectral images of the signal arising from the impact of impact on the earth's thickness to be used in spectral-seismic surveys. That is, to obtain information about the size of objects lying in the earth's strata.

If the earth's stratum in terms of acoustic properties was a combination of reflecting boundaries, then traditional ray seismic survey would be logical and convenient. But since it turned out that the earth's strata by acoustic properties is a combination of oscillatory systems, it is logical and only possible to construct a section with respect to the frequencies of seismic signals recalculated to depth using the expression (1) for seismic exploration.

After the elastic oscillatory system in the form of rock layers was discovered, many other phenomena and physical effects were discovered. In my practice, I have repeatedly been convinced of the correctness of methodologists who argue that equipment or methods based on new physical effects inevitably turn out to be a source of fundamentally new effects. In other words, any discovery is the source of new discoveries.

During the first 16 years after the discovery of EOS, studies of the roof of underground workings were carried out. The standard for checking the accuracy of determining the thickness of the immediate roof of the coal seam was the drilling data. Our main object for research was the mine Raspadskaya, in the Kemerovo region. It was the only mine in the USSR, which had the ability to determine the structure of rocks to be drilled into the roof with rising wells, directly from underground workings.

Initially, we hoped that with our equipment we would receive information about the thickness of the direct roof, but in fact, we received information not only about the thickness of the first rock layer from the coal seam, but also about all the stratification surfaces of rocks to a height of 50m.

The fact is that, as we thought at the beginning, most often stratification of rocks occurs where a change in the lithotype takes place, or where interlayers occur (carbonaceous, marly, mica, etc.). These stratification sites are recorded by both geophysics and drilling. But, as it turned out, there are stratifications, where there are no interlayers, no changes in the lithotype. And such stratifications are recorded only by geophysics (by our equipment, which was called Resonance). Geologists did not understand what kind of stratifications they were, and they suggested the term - the surfaces of weakened mechanical contact (WMC surfaces) [5].

At about the same time, was a conflict situation arose when, according to the results of our research with the help of "Resonance" equipment, it was necessary to erect additional support in the preparatory drift. There, drilling showed that a very strong fine-grained sandstone with a capacity of 15 m lies above the coal seam.

The 15-meter capacity of the immediate roof does not imply the necessary extra support. But the fact is that our measurements, confirming the 15-meter thickness of sandstone, showed that this sandstone is in a thin-bedded state.

The management of the mine did not consider it necessary to erect a roof. I had no choice but to write a statement to the director of the mine and demand the construction of lining in the zone of thin sandstone. The management of the mine considered such a claim unethical, and I was asked to leave the mine. But the support they still erected.

A month and a half later, the roof in this zone collapsed, and if it had not been erected, contrary to the opinion of the management of the Raspadskaya mine, people would suffer. It was then that the mining geologists realized that geophysics provides more reliable information than drilling. After that, they began to abandon drilling in favor of geophysics. But where such WMC surfaces come from, it became clear when we began to predict the collapse of roof rocks from the earth's surface using the spectral seismic equipment. But this will be discussed later.

Electric oscillatory systems and elastic oscillatory systems have much in common both in their manifestations and in work with them. they complement each other. If electrical circuits opened the atmosphere, the stratosphere, space for us, then the EOS is the Earth’s interior. I must say that if, prior to the discovery of EOS, our knowledge about the depths of the Earth was limited by the capabilities of the shovel, now we can easily explore the mass of the Earth to hundreds of meters. And sometimes kilometers.

If the opening of the electrical circuit allowed solving the communication problems (radio, TV), then the opening of the EOS made it possible to predict all man-made disasters of geological origin. So, now with the help of UKS, it is possible to predict and, consequently, prevent accidents occurring in the underground space, in mines, mines and quarries. Moreover, the forecasting capabilities are not limited to any depth.

I-5. PHYSICAL EFFECT № 2. CONDITION OF FORMING EOS

The emergence of situations where the use of the Resonance equipment, which implements the spectral-seismic survey method, has increased the safety of miners, has led to an increase in demand for this equipment.

But I suddenly realized that, based on the generally accepted theory of the field of elastic oscillations, there should be no effect No. 1. Indeed, in order to form an oscillating system, it is necessary to have a mechanism for converting the shock into a harmonic process. In all known oscillatory systems, this mechanism is known. But in the EOS - no.

In search of such a mechanism, it was found that not all objects from solid media are resonators. So, plexiglass and some plastics are not resonators. Apparently, these materials do not contain a mechanism for transforming the shock effect into a harmonic response. Well, and

the group of resonators include metals and alloys, rocks, ceramics, glass, ice. But what is the difference between them? ...

After almost five years of torment and searching, I suggested that this mechanism mast manifest itself as some kind of speed anomaly. Taking several samples of plexiglass and glass, I looked at whether the average thickness of the sample was dependent on its thickness. Figure 3 and the table show the dependences of the velocity V, determined normal speed ultrasound when their thickness h changes.

Samples for which the speed is constant (like dependence 1 on the Fig.3) are not resonators. If the Earth's stratum consisted of non-resonators, apparently, in it, the ray seismic survey would work.

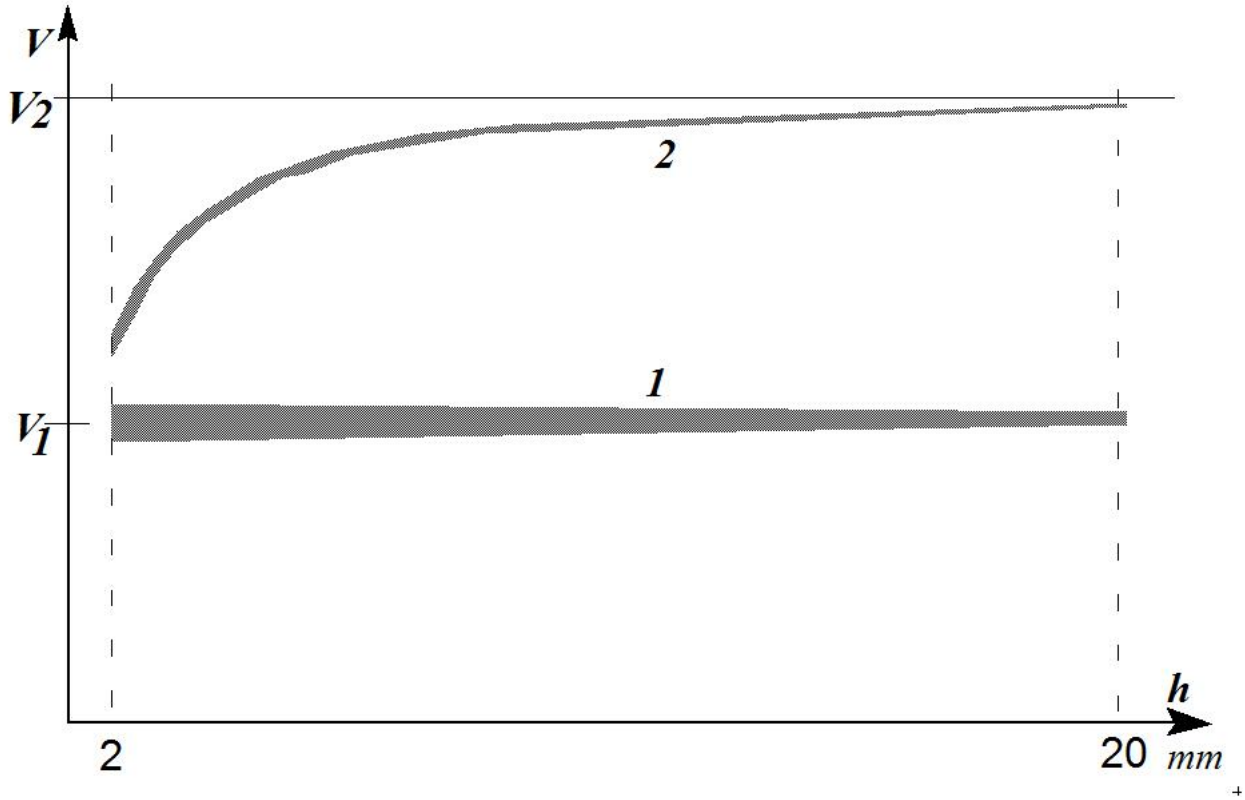

Fig 3

Seeing the dependence 2 V (h) in Fig. 3, which takes place for resonans objects from a wide variety of materials, I began to check this effect on all kinds of materials, on samples of various shapes and sizes ... And it turned out that the variability of speed when changing The dimensions of the resonator samples are somehow related to the mechanism of the formation of the resonators.

We have met repeatedly with a dependency similar to schedule 2. This is how a car moves, if we determine its average speed when the distance between the beginning and the end of the track changes. Its speed changes smoothly at the beginning of the path and at the end of it. And due to the presence of these sections of a smooth change in speed — at the beginning and at the end of the movement, a change in the mean value of speed is obtained.

Special measurements, described in detail in [6], showed that the propagation velocity of the field of elastic oscillations Vfr (h) during normal (perpendicular) sounding of sample changes as shown in Fig.4.

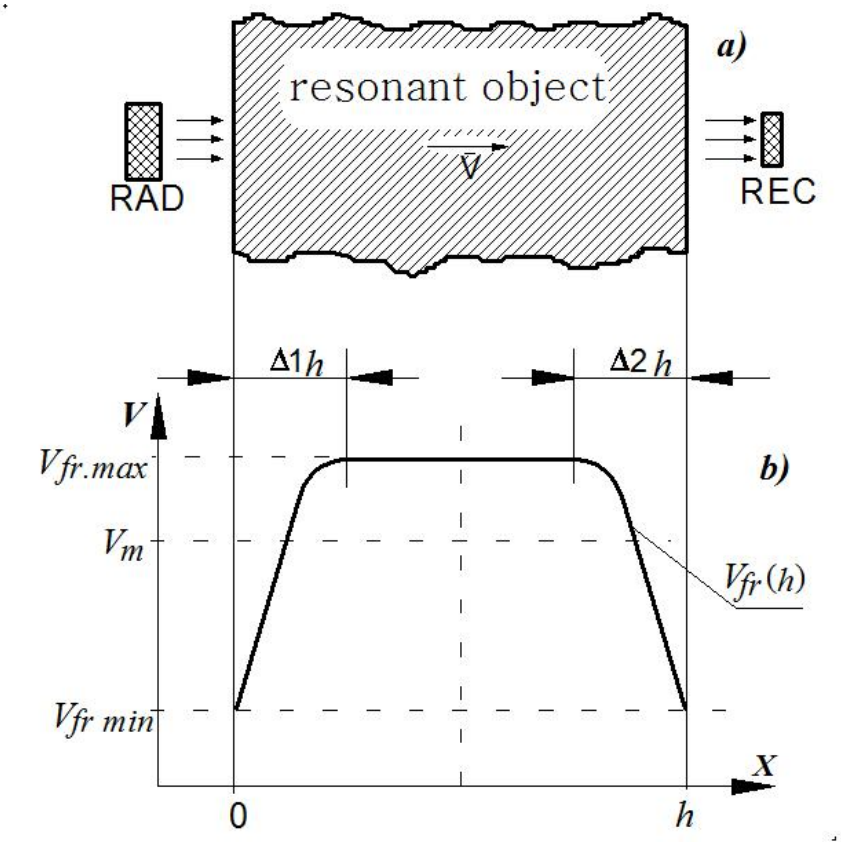

Fig. 4

(table 1)

material	thickness *h(mm)*	velocity *V(m/s)*
plexiglas	3	2780
« »	4	2820
« »	5	2820
« »	6	2800
« »	7	2810
« »	9	2800
glass	2	5260
«»	4	5450
« »	6	5580
« »	8	5620
« »	10	5680
duralumin	2,8	6100
« »	3,94	6180
« »	4,95	6200
« »	5,93	6250
« »	7,93	6380

steel	1	4000
« »	3	5400
«»	4	5500
« »	5	5600
« »	6	5670
« »	7	5750

Table 1 shows the average values of the velocities for the thickness of samples from Plexiglas, glass, duralumin and steel.

At through pass-through candling of layer-resonator , the acoustic beam at the beginning smoothly increases its velocity V_{fr} (h) from $V_{fr\ min}$ to $V_{fr\ max}$, and then with speed $V_{fr\ max}$ spreads to the opposite near-surface zone Dh, where it slows down to $V_{fr\ min}$ near the boundary of the layer-resonator . The average velocity of propagation of the field of elastic oscillations V_m (middl) will be the smaller, the smaller the thickness of the layer-resonator h.

The presence of near-surface zones of a smooth change in the velocity Δh is an indispensable condition that the object will manifest the properties of a resonator. If a thin layer of clay is applied to the Plexiglas plate, it will become a resonator. If the plate made of plexiglass is round, then if you apply the clay along the contour, it will become a resonator only in diameter.

Moreover, if a layer of thickness h with a velocity distribution over the thickness of this layer, similar to that shown in Fig. 4, is formed in the oceanic water column, this layer of water will manifest properties of the resonator. And indeed, in the oceans at a depth of about 1000 m there is a layer of water, the speed of sound in which varies in depth as shown in Fig. 4b. It is known as an ultra-long-distance sound channel. If a depth bomb is blown up within this layer, an oscillatory process will occur in this layer, which will reach the coast with minimal attenuation, no matter how far they are.

This phenomenon was discovered by American scientists M. Iving and J. Vortsel in 1944. Having installed coastal hydroacoustic stations in all of their ocean coasts, designed to record the appearance of enemy submarines, the Americans accidentally discovered this phenomenon. Why no one attached importance to the fact that this oscillatory process has the form of a harmonic damped signal - I do not know. The speed of propagation of this signal is equal to half the speed of sound propagation in water, which is also a sign that this channel is an oscillatory system.

And again, as always, when a new physical effect is discovered, it confidence arises that this could not be. And again, you can easily prove it.

In fact, is it possible that the speed of movement of anything or the spread of anything itself, without external influence, changes?! Here, of course, there must be some kind of mistake.

I-6. PHYSICAL EFFECT №3. CURVATURE OF THE VECTOR OF SPEED IN ZONES Δh

Now I don’t remember how long it took me to figure out that the V_{fr} (h) graph, shown in Fig. 4, can have a similar shape and without changing the speed value. For this, it would be enough for the velocity vector in the border areas of Dh to be bent (!) Without changing its value. After all, by measuring, as a result of which we get the V_{fr} (h) curve in Figure 4, we do not determine the speed, but the projection of this speed on the $\boldsymbol{X}$ axis.

True, I absolutely can not imagine the physical meaning of the velocity vector. But if the propagation velocity vector of the field of elastic oscillations is bent in the near-surface zones, then this means that with normal sounding of the resonator sample, the tangential field component should arise, which, generally speaking, is strictly not allowed in the course of theoretical acoustics.

And again there was the problem of experimental evidence of this our assumption ...

This evidence was obtained by observing the effect of acoustic resonance absorption.

I-7. PHYSICAL EFFECT № 4. EFFECT OF ACOUSTIC RESONANT ABSORPTION (ARA)

In the early 80s, I decided to put a monochromator effect in the laboratory as a laboratory work. The objective of this experiment was to verify the difference in the effect of the monochromator in the layers-resonators and the layers-nonresonators. For some time there was an assumption that the oscillatory process arising in the course of the occurrence of natural oscillations is a consequence of the effect the monochromator.

A monochromator in acoustics is an analogue of a monochromator in optics, where it is also called the effect of anti-reflective optics.

To observe the effect of the monochromator, it is necessary that the signal exciting the piezoceramic emitter, being harmonic and varying in frequency if necessary, and would have a limited duration, that is, it would be simultaneously pulsed. Otherwise, it is impossible to separate the primary and reflected signals. In the literature, it is recommended to use for this the so-called radio pulse signal, which is shown in Fig. 5a and represents a harmonic signal enclosed in a rectangular envelope.

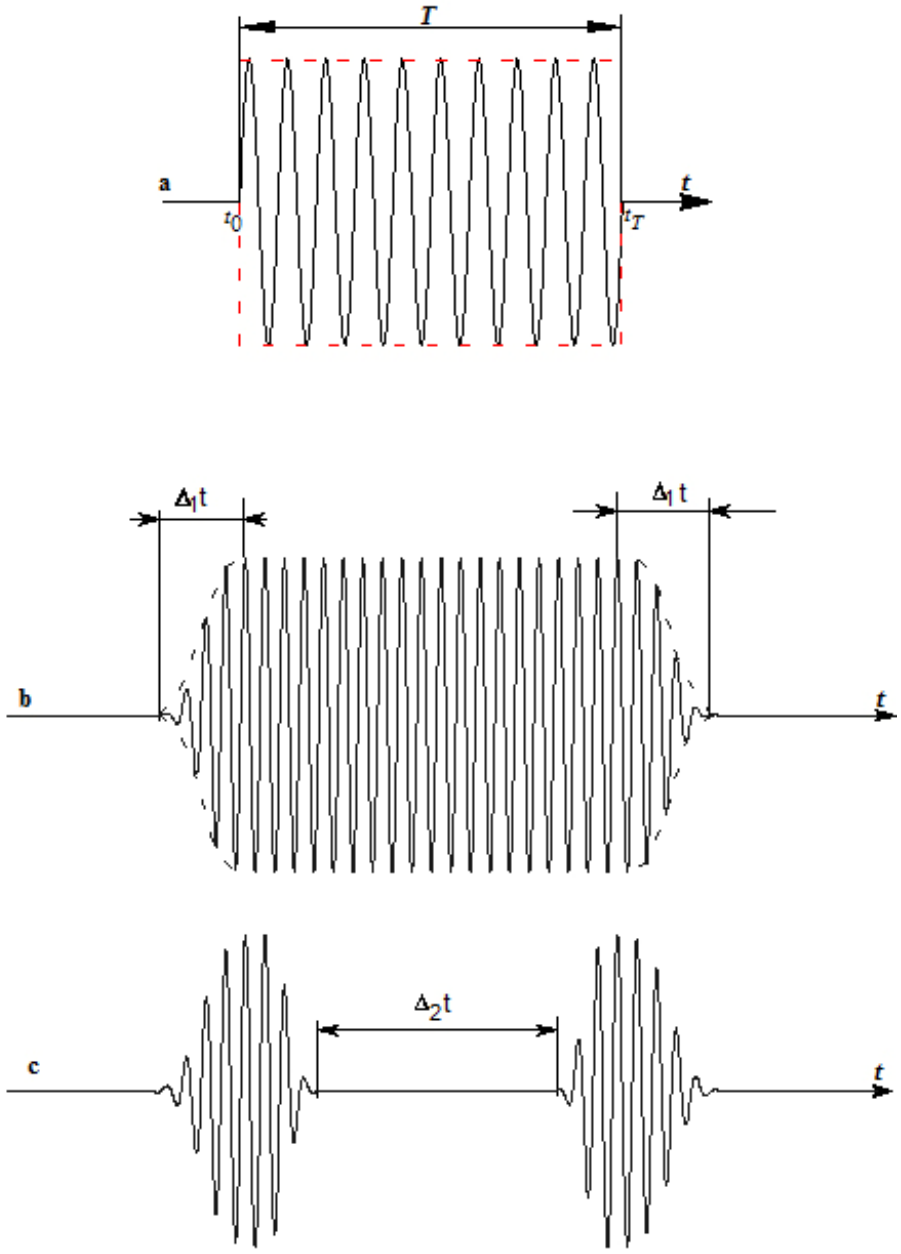

Fig. 5

The effect of a monochromator arises as a result of purely interference processes. Sounding a plate with a thickness h by a sinusoidal signal with a frequency f_{mc}, at which we get the complete passage of the field through the plate and the complete absence of reflection from it.

However, as experiments have shown, it is impossible to do the effect of a monochromator using the radio pulse shown in Fig.5a. First, it is impossible to create such an ultrasonic pulse. The fact is that the beginning and end of a real radio pulse has shock-like segments. And if the emitter is a piezo-ceramic, then it is an oscillating system, and the shock-like parts of the probing signal will initiate in it its own oscillatory processes, which will distort the radiated signal so that with its help it will be impossible to create a probing signal of the desired shape.

To observe the monochromator, a probing signal is needed, having the form shown in Fig. 5*b*. A feature of this signal is the absence of shock-like areas. That is, there should be a smooth increase and decrease of the signal. Observation time - $\Delta_2 t$. During this time, the amplitude of the probing signal is unchanged, and the frequency of this signal must be such that the direct signal and the signal reflected from the back wall of the sample are antiphase, and then the resulting signal that is reflected from the sample being heard will be zero.

The effect of the monochromator perfectly illustrates the law of conservation of energy. The reflection coefficient of the signal from the sample plus coefficient transmission trough the sample is equal to one. The monochromator's effect may be observed both in resonators plates and in non-resonators.

One day observing the effect of a monochromator when examining a glass sample, I increased the frequency of filling the probe pulse about by 10 percent. And saw how the signal disappeared, which at all other frequencies passes through this sample.

The signal passing through the sample acquired the form shown in Fig. 5c. That is, there was an effect when the signal passing through the plate-resonator, at some frequency is absent during the time $\Delta_2 t$, when the amplitude of the signal of the probing signal does not change. The reflection coefficient has not changed at all.

This effect takes place only in the sounding of the resonator plate.

In search of the missing signal took several years. At the same time, I could not give this laboratory work to students, and could not make a publication, because I did not understand at all what was happening.

I no longer remember how it occurred to me to put the piezo receiver 4 as shown in Fig.6.

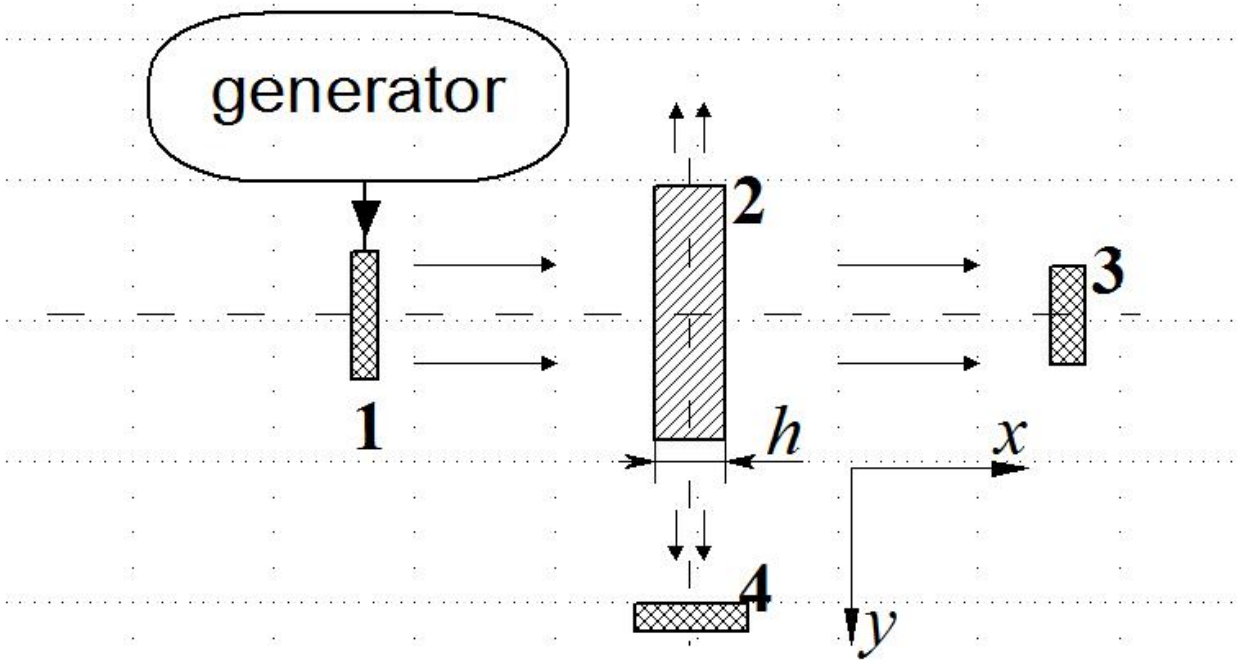

Fig. 6

The missing signal turned out to be exactly where the piezoceramic receiver 4 is located. You can easily make sure of this if the signal from the Vykh-4 connector to file to an oscilloscope. And what followed from this ... It turned out to be the most dizzying find.

It turned out that the field excited by piezoceramics **1** in such a way as to propagate in the direction of the ***X*** axis, at the natural frequency of the resonator sample f_0, is reoriented by 90°. By analogy with other known resonance absorption effects (paramagnetic resonance, ferromagnetic resonance, electron resonance), can be called the effect of acoustic resonance absorption (ARA).

Spreading in the orthogonal direction, in the direction of the y axis, this field, when it reaches the object boundary, will be reflected from this boundary and go in the opposite direction.

In practice, this means that during seismic exploration the echo signal arrives at the seismic receiver not from the bottom, from the depth of the mountain massif, but from the side. Rather, from the sides. Naturally, in this case, in principle, it is impossible to even imagine that the results of seismic exploration can correspond to the actual geological structure. Well, really, if all the seismic surveys are for receiving echo signals from below, but in fact they come from the side, then it is impossible to count on receiving information from the seismic survey corresponding to the geological structure.

Fig. 7 shows the set of frequency characteristics of all elements involved in the laboratory setup for observing the effect of ARA.

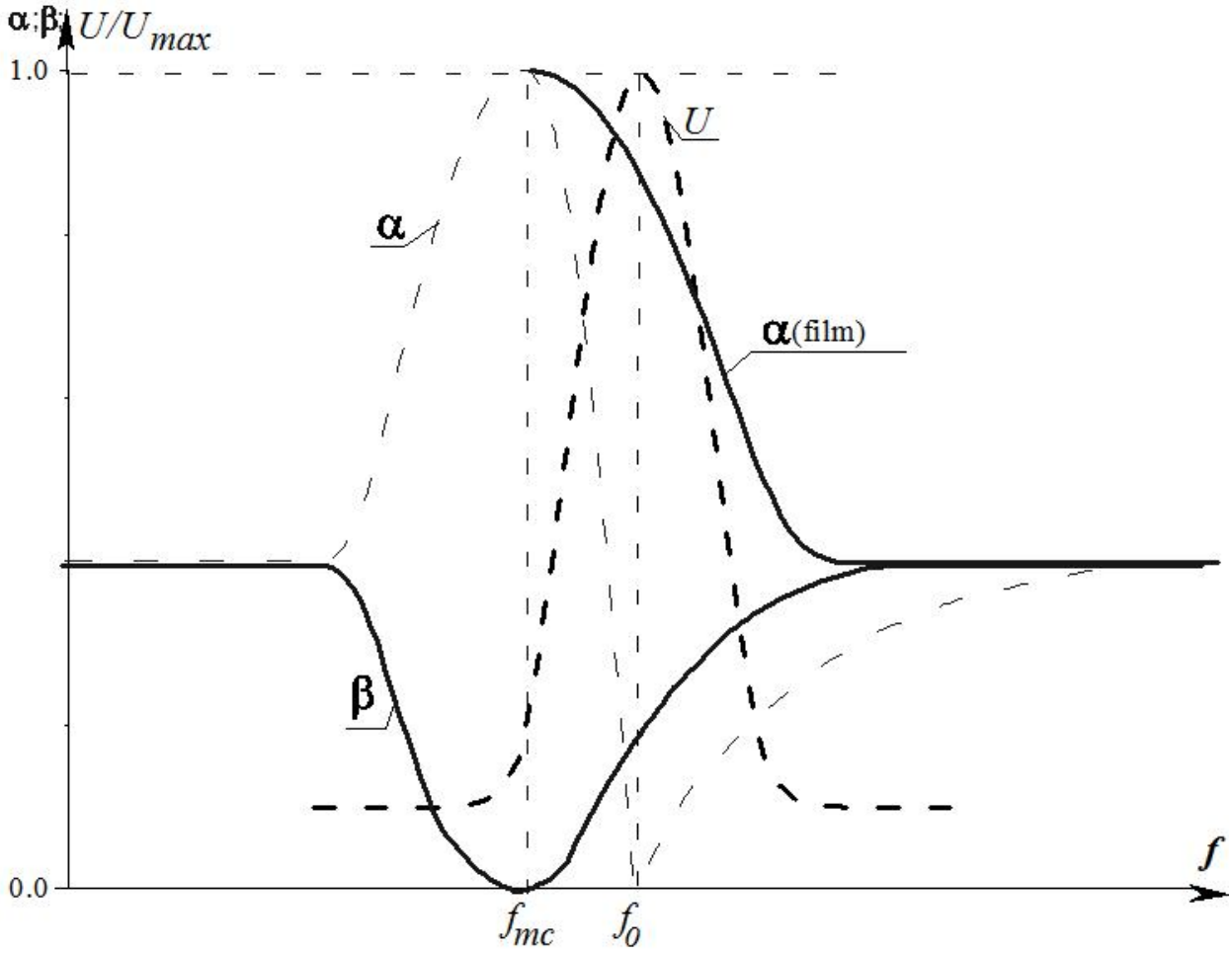

Fig. 7

Designations in Fig. 7: α - transmission coefficient. At the frequency of the monochromator f_{mc} = 1. That is, the entire signal passes through the sample at the frequency of the monochromator. β is the reflection coefficient. At the frequency of the monochromator f_{mc}

$\beta = 0$. Well, that's right, $\alpha + \beta = 1$ - this is the fundamental relation of the monochromator, confirming the law of conservation.

Very clearly it turns out, if a piezoceramic disk is used as a sounding sample **2**. Then the frequency f_0 is its resonant frequency. This can be seen in the $U(f)$ chart. U is the EMF on its plates, and its value has a maximum value at the resonant frequency of the sample, f_0. We already know that at this frequency $\alpha=0$. That is, the signal at the point where receiver 3 is located (in Fig. 6) must be equal to 0. And, as mentioned above, at the resonance of sample 2 there is no signal at this point. At frequency f_0, the signal appears where the piezoceramic receiver **4** is located (in Fig. 6).

I – 8 EFFECT OF PIEZO FILM

Our use of piezofilm began in the mid-80s for seismic receivers, when it became clear that the seismic receiver should not have any natural frequency. The piezofilm is a metallized polyethylene film and has no natural frequencies. Piezoceramics is a resonator and has its own frequencies. Therefore, if piezofilm had not yet existed, then this topic (creation of a receiver for spectral-seismic survey measurements) would have to be stopped before the invention of such a film.

However, along with the necessary property for our measurements - the lack of natural frequencies, she discovered another property that I'm trying to to unravel for more than 30 years.

One of the problems that arose when studying the effect of ARA was that in the installation in which this effect was performed, shown in Fig.6, 3 resonator objects were involved in a row. The emitter 1, the sample 2, and the receiver 3. Each of them has two natural frequencies (in thickness and diameter). As a result, the total frequency dependence at the point where the receiver 3 is located has such a number of natural frequencies that the graph of the total frequency dependence is too jagged.

To reduce the number of natural frequencies, it was decided to use a piezo-film as a converter 3 (in Fig. 6). EMF taken from piezofilm is shown in Fig. 7 as α (film).

At the same time, a completely unexpected effect was found. The piezofilm, which showed the same properties as piezoelectric ceramics as a geophone, did not detect the absence of a field at the frequency f0 at the transducer 3 location. That is, if we hadn’t discovered the effect of ARA before, then using piezofilm, we would never have discovered it.

But it means that it turns out that the field of elastic oscillations has two components. One of them is recorded by piezoelectric ceramics, and the other is by piezofilm ... But I don’t know what these components are.

And I have no confidence that in the time of my remaining life I will be able to unravel this phenomenon.

I-9. RESONANT ANISOTROPY AND EFFECTS OF IT

As the ARA effect has shown, the acoustic properties of resonator objects include anisotropy. But this is a special anisotropy. Layers-resonators have excellent sound conductivity, but only in directions orthogonal to the direction of their normal sound (in the direction Z in accordance with Fig.8). This happens only at a frequency equal to the natural frequency (f_0) of the resonator layer in its thickness.

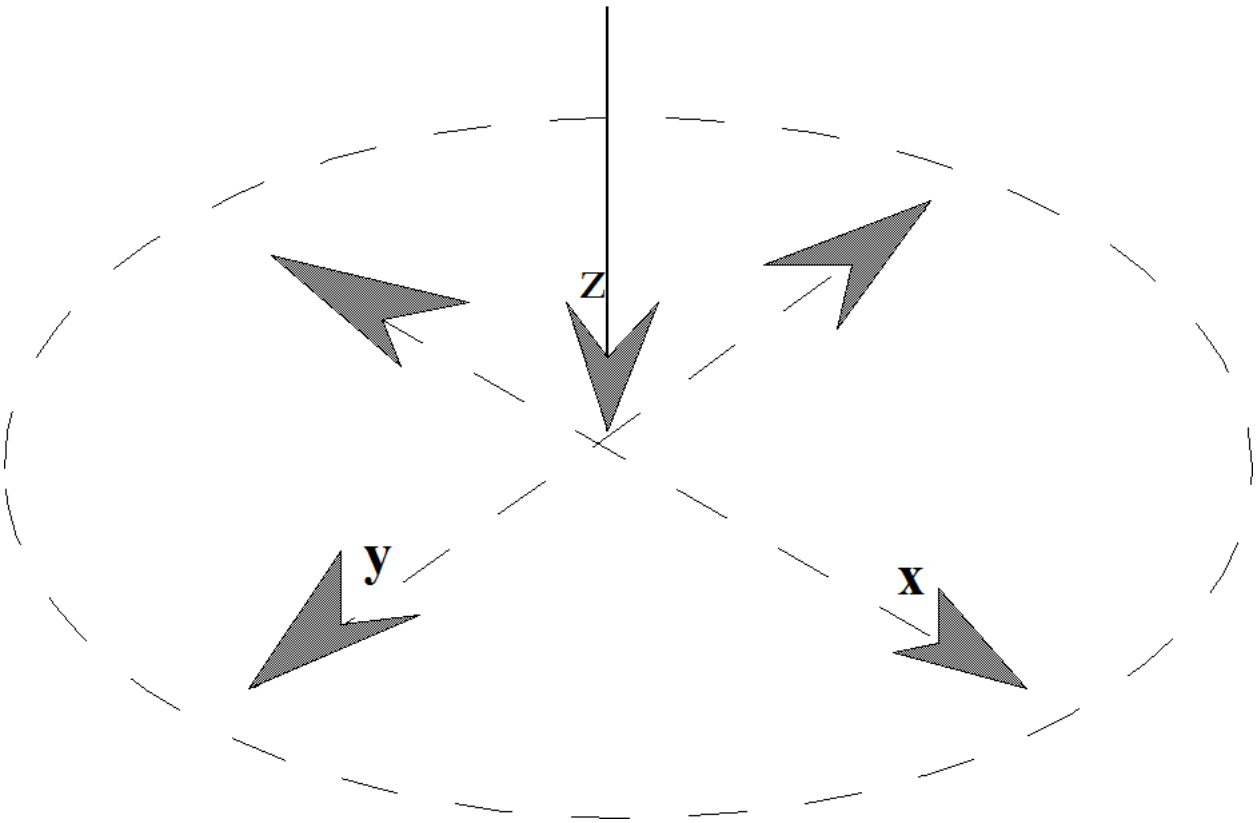

Fig. 8

In the case of an impact on a sufficiently long resonator layer of thickness h (in accordance with Fig. 8), a signal having a frequency of 5000/2h will appear in this layer. This signal propagates in the *xy* plane at a speed of 2500 m/s.

The field propagation velocity through the layer is denoted as V. Then the field propagation velocity along the resonator layer is approximately V/2. At the beginning, near the point of impact, this velocity is somewhat less than V/2, and during removal this velocity approaches the value V/2. When approaching the reflecting object, it decreases slightly.

If the tectonic disturbance zone is on the path of the field, then by varying the location of the impact point and constantly determining the time of arrival of the echo signal from this zone, it is possible to determine where this zone is located.

At some stage in the study of this topic, the possibility of detecting zones of tectonic disturbances was very relevant and in demand. It has now become possible to identify zones of tectonic disturbances by a much simpler and more effective method. But about this - later.

In order to deal with the physics of resonant anisotropy, it is necessary to involve the functions of a complex variable, but unfortunately this is not possible for acoustics due to the lack of a metrological base.

I-10. PROPERTIES OF OBJECTS-RESONATORS

Moving from simple to complex, we will first consider a single object-resonator. The single resonator has a single natural frequency f_0. To create a single EOS is not always possible.

Object-resonator has as many natural frequencies as its dimensions. We have so far considered a single layer resonator (for example, the rock layer resonator), but in practice this case is extremely rare. In fact, the rock layer lies on another layers-resonators (or on a set of resonator layers), or/and under another resonator layer. And on the frequency response of a real object, a set of resonator layers lying together is necessarily present, and appear frequencies of all resonators touching each other.

When it was my very first dimension, this is when I saw in a layer of rock, which I studied, in a coal mine, a sign of one oscillatory system, it was implemented on a single resonator layer, on one EOS. But if at my first measurement it was EOS, having several natural frequencies, then

I simply would not recognize the presence of EOS in such a graph. When we understood this, we began to call such cases multi-humped camels.

Apparently, then, in 1977, on the day of our measurements, the rock overlying the coal seam, had just peeled off from the overlying strata, and had no acoustic contact with it. I think that the next day, we would not get such a picture. Most likely, a constantly sagging overlying layer would have pressed against this rock layer from above, and the resulting picture would have not one, but more frequencies (f_{0i}) (humps).

Therefore, when I read that discoveries usually are made as a result of lengthy scientific work, it is very funny to me. And I dare to assure that and this is my discovery, and almost all of the others were discovered by chance, thanks to the grace and will of His Majesty the Case. Or, in other words, the discovery of a new physical effect is a purely probabilistic process. But, which is very important, the discovery of a new physical effect is possible only through experimental work.

In laboratory studies, a single EOS can be realized if you have a round solid ball (preferably glass), which is suspended on a strong thread, and lies on multilayer foam rubber, and its acoustic contacts with foam rubber and thread should be the same. The fact is that the thread is tied to something, and foam rubber is lying on something. Somehow, the other may be in contact with some kind of EOS, and the ball may be in contact with some kind of EOS. To excite such a ball at its own frequency should be using a small ball, which should be dropped on its surface.

But this causes another problem. After all, to see the natural oscillations resulting from a small ball falling on the ball, an acoustic contact of the glass ball with the sensitive element is necessary. I tried to use for this a small piece of piezoceramics, sticking it with beeswax to the ball. But this led to a change in the value of the natural frequency of the ball.

But, in the end, I realized that in laboratory modeling, one can come to terms with such distortions. But when it comes to using a glass ball as a standard for single-frequency EOS, you will have to look for other methods of acoustic insulation of the standard from the environment.

Yes, so about the monofrequency and polyfrequency of the field of elastic oscillations with ultrasonic effect on piezoceramics 1 in Fig.6. Yes, indeed, in order to obtain a short ultrasonic monofrequency signal of the type shown in Fig. 5b, we had to solve some difficult problem from the field of circuitry. However, in practice everything turned out to be much simpler, and Nature herself solved this problem. With the impact of the impact on the Earth's thickness, consisting of a set of plane-parallel resonator layers, as many mono-frequency damped signals arise as there are resonator layers. A signal similar to the one shown in Fig.9 is excited in each of these layers.

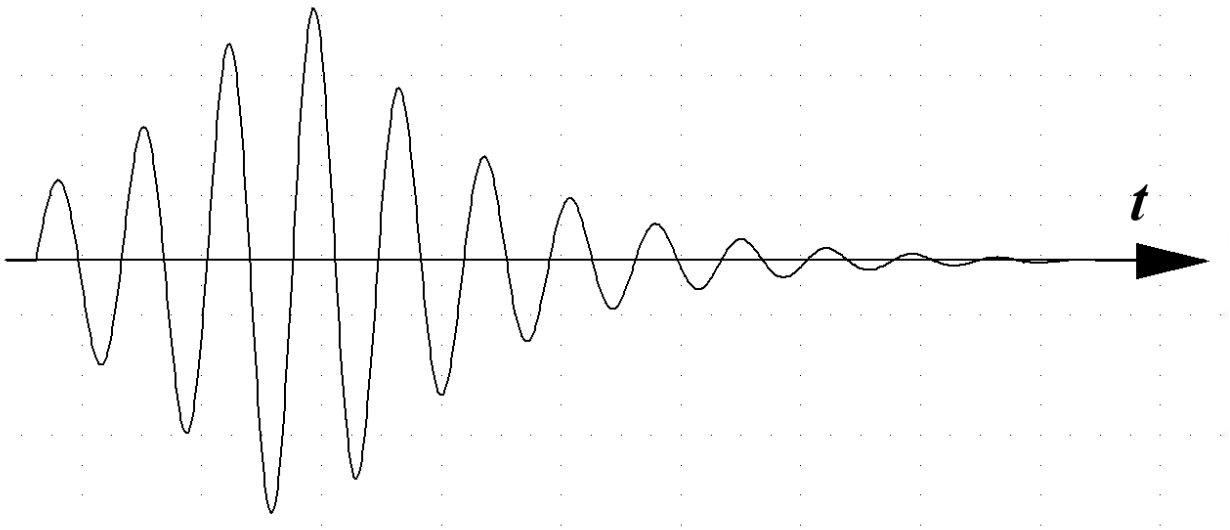

Fig. 9

This signal (it is also called a packet or a bundle) spreads along its own (which created it) resonator layer, with a speed equal to about half of 5000m/s (if these are rocks), without going beyond its limits. The attenuation of this signal is extremely low. Consequently, if we are talking about a layered mountain massif, then with the impact of impact on its surface, there are as many frequencies as there are in the given place in the array of resonator layers. And there are no other signals (only monofrequencies).

In addition, this effect is used when, pressing the ear to the ground, listen to the approaching cavalry, and hear it long before you can see it. In this case, it is not the hoof beats that is heard, but a low-frequency signal (hum).

This effect is perfectly observed in the oceans, in the channels of super-long-range sound propagation, as well as during seismic measurements using the vibroseis method.

I – 11. PROBLEMS OF SEISMICRECEIVERS

The task of the geophone is to receive an electrical signal that is identical in parameters to an acoustic signal at the point of contact of the geophone with the object under study. But these are common words, since the parameters of an acoustic signal without a seismic receiver are not subject to study. But. There is no acoustic standard in the chamber of measures and weights, and therefore acoustics in general and seismic receivers in particular cannot be discussed from the standpoint of metrology.

And at the same time, according to the existing literature, there are seismic receivers reacting to one or another type of elastic oscillations, as well as receiving a signal from a certain side. The development of three-component seismic receivers is being advertised. It's a delusion. Seismic receivers, as well as seismic prospecting in general, are not within the competence of the metrological services, and that says it all. No man can say which type of elastic vibrations is to be investigated, and from which side he came. And in general, what type of elastic vibrations takes place in a particular case.

Since there has not been a single case of coincidence of the seismic section with the geological section over the entire existence of the officially recognized, seismic survey the parameters of the seismic receivers do not affect anything, and they may not be discussed.

From the standpoint of spectral seismic prospecting, the spectrum of the electrical signal should be identical to the spectrum of the seismic signal. This task is solved not only by the seismic receiver, but also the receiving device as a whole.

If you open the literature on seismic receivers, you will learn that the seismic receivers are sensors of the field of elastic oscillations and do not introduce frequency distortions in measurements, because their own oscillatory process is characterized by a frequency that is distant from the frequency range of the studied fields. Either significantly lower, or significantly higher, and in general all this is unimportant. This definition is accepted because the seismic signal spectrum has never been the subject of study before, and therefore about it could say anything.

By itself, a seismic receiver suitable for spectral seismic surveys should not have any natural frequencies. Otherwise, in seismic measurements, an effect similar to the effect of coupled contours will arise, when the magnitudes of their natural frequencies change as the contours come closer.

It is very easy to check the presence of natural frequencies in the seismic receiver. To do this, connect it to an oscilloscope and drop a small, 2 mm steel ball from a height of approximately 30 cm to the body. In this case, the geophone must lie on thick multi-layer foam. The oscilloscope should result in one short pulse. For this purpose, the seismic receiver should be made of Plexiglas, and as a sensitive element - piezofilm. When used in the field, the seismic receiver should be pressed to the ground with a small plastic box filled with sand.

For comparison, if we expose any of the existing seismic receivers to similar studies, we will see not a short burst, but a long oscillatory process. Thus, working with any seismic

receiver, we will observe a signal that simply does not exist in the array under study. This signal arises in the geophone itself as a result of exposure to a short signal.

I – 12. WORKING WITH A LAYERED MASSIF

Assume that the section of the earth's strata to be investigated using the field of elastic oscillations is a layered medium similar to that shown in Fig.10.

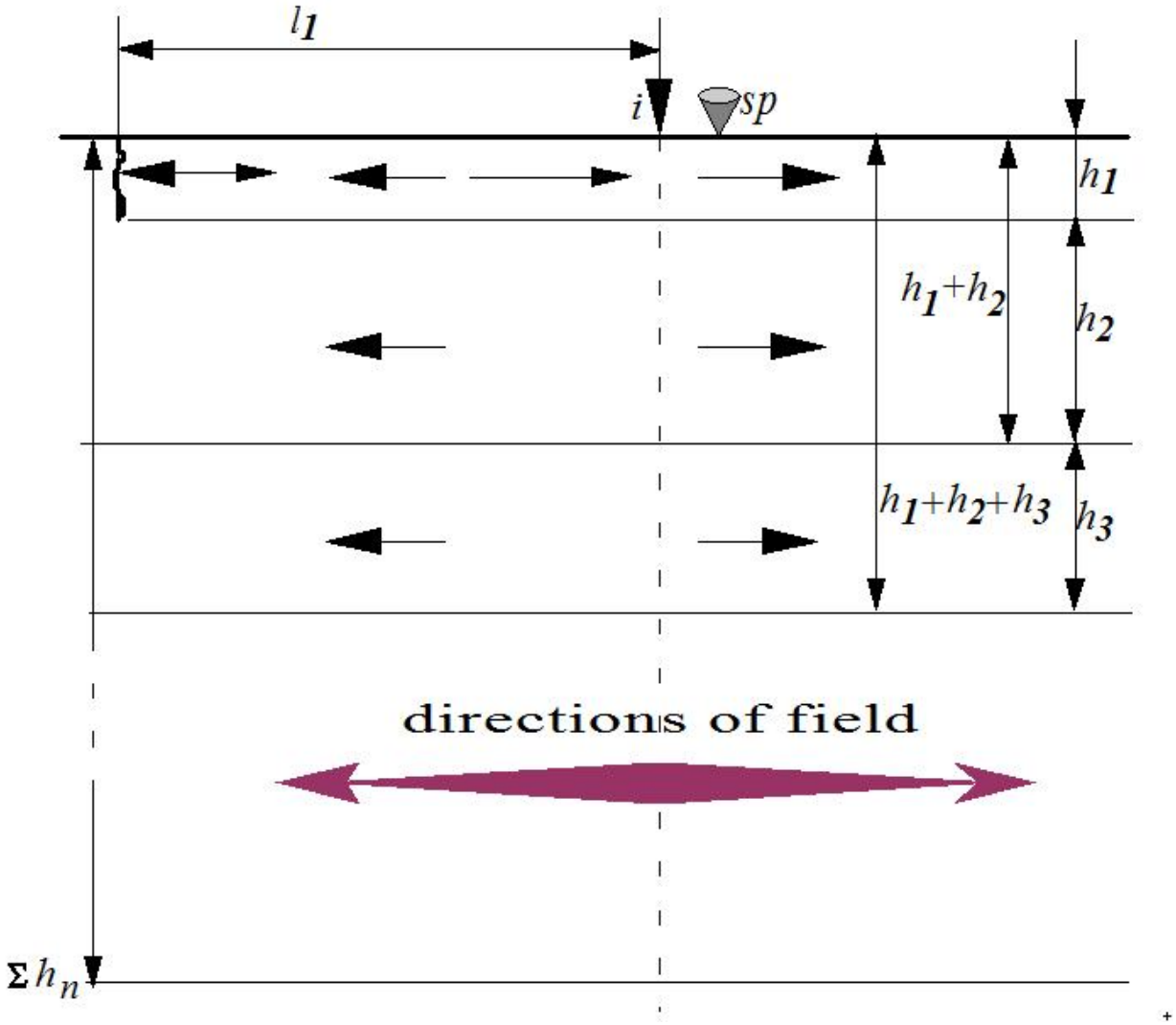

Fig. 10

The point of impact ***i*** is located on the surface of the Earth's stratum, nearby, at a distance of 10–20 cm from the location of the seismic receiver *sp*. In case of impact on the Earth's mass, the resulting signal propagates in directions parallel to the stratification directions.

A signal will appear in each of the layers, the frequency of which corresponds to the power hi, and not only simple, but also composite. But since the oscillatory processes do not go beyond the limits of the corresponding resonator layers, we will be able to learn about the magnitudes of these frequencies only for those layers that are affected by the geophone. Namely, the layers h_1, $h_1 + h_2$, $h_1 + h_2 + h_3$, etc. We do not know anything about oscillatory processes in layers that do not relate to a geophone.

If at a distance l_1 from the impact point the rock layer h_1 for some reason broke off, and a boundary formed in the discontinuity zone, the oscillatory process that formed in the h_1 layer will reflect from this boundary and go back, again within the h_1 layer, and the geophone records the echo. By the presence of this echo and by the moment of its passage through the seismic receiver, the value of l_1 can be determined.

By changing the locations of the impact and point of the seismic receiver and repeating the impact, you can determine the location of the boundary from which the signal is reflected.

Now about the vibroseisse. The emitter "vibroseis" is a heavy steel plate, on which a heavy engine with eccentricity is installed. The frequency of the radiation field of elastic vibrations is equal to the speed of rotation of this engine. Thus, vibroseis is a pure sine wave emitter.

In accordance with the scheme shown in Fig. 10, the vibro-plate plate radiating the frequency f is included in the rock layer with a thickness of h=2500/f. (see expression (1)).

An experiment was performed to test this model of seismic exploration. The emitter - a vibroseis weighing 300 tons was located in the village Bystrovka of the Novosibirsk Region, and the receiver - in Kazakhstan, at a distance of 1000 km from the radiator.

The experiment was carried out by geophysicists of the Institute of Geophysics in the Novosibirsk Academgorodok.

The radiation was carried out by a signal, very slowly varying in frequency. The reception was carried out with amplitude, with a sufficient level. However, at three frequencies signal was no . These frequencies was 4, 7 and 8.5 Hz. Since the disappearance of the signal from the standpoint of traditional seismic surveys cannot be explained, it was not included in the report.

Geophysicists was considered that the disappearance of signal on three frequencies took place due to some kind of malfunction in the installation.

But actually, it's very simple. Among the layered structures (see Fig. 10) there were no rock layers-resonator with thicknesses h1 = 2500/4 = 625 m; h2 = 2500/7 = 360m and h3 = 2500 / 8.5 = 295m. There, probably, there were there was not yet any layers, but the upper frequency of the vibroseis was only 15 Hz.

I - 13 IN PROTECTION OF A TRADITIONAL SEISMIC EXPLORATION

Once we worked in the field, looking for a point of water inflow. A young man, driver, brought us there. He very carefully watched what and how we were doing, and when we made the first profile, he said: “Now I understand what and how you are doing.” I asked him what he understood. It's not tricky. Hit to the earth and see the echo. As it turned out, he has education - 8 classes, and he just learned about geophysics and seismic prospecting.

For him, the principle of seismic exploration was so obvious and simple that it did not require any explanation. He would have knowledge of mathematics, and he would have easily written a book about it, even a textbook on seismic prospecting.

This principle of seismic prospecting is as obvious as the fact that the Earth is flat, and that the Sun revolves around the Earth, that heavy objects fall faster than light ones, and so on. And I realized that the main wisdom of the methodology for the development of scientific knowledge is the statement that the obviousness, unproven experimentally, is a way to a dead end.

And I somehow suddenly realized that 100 years of lies of all seismic prospectors about the effectiveness of seismic exploration are not because they are so liars ... Seismic prospecting was let down by its obviousness and lack of knowledge among principles of methodology. Cheaters - teachers of the departments of philosophy. Instead of giving students knowledge of methodology, they lie about Marxist-Leninist nonsense.

I already said somewhere that back in 1973, when I was given to read the course of geophysics, i, discovered that there was no laboratory seismic research in this course, I went to the head of the department of geophysics Head of the Department of Geophysics at the Mining Institute Igor Litvinenko. He was surprised by my request and very kindly began to explain to me that the seismic survey is so simple and obvious that it is pointless to carry out laboratory work on it.

Despite the resistance of geophysicists, I created laboratory works, with the help of which I was able to detect many properties of the elastic wave field and create a new direction of seismic prospecting - spectral-seismic survey profiling.

II-PRACTICE

II-1 KOLA SUPER-DEEP

The Kola ultradeep well is a very serious stage in the life of geophysics. On the other hand, the source of many legends. Its idea arose as follows.

Around the 50s Twentieth century, many geophysicists became aware of the big secret of seismic exploration, and scientists were worried ... The fact is that, despite the obviousness of the idea of seismic exploration, it did not give practical results. No, not exactly. The results described by Mohorovicić were impressive. And academician Prince Golitsyn also reported on very bright dimensions. But the trouble is that these results refer to the very beginning of the twentieth century. But later, when the equipment became significantly better, it was not possible to repeat these measurements.

It has already become impossible to conceal that not a single seismic surveyor will do his job without having the results of drilling, and cases of falsification of the results of seismic measurements could not be hidden for a long time, and some scientists was needed to know the truth. It was brewing scandal. And then there was the idea of an international project, the purpose of which was to figure out what was actually happening in seismic exploration.

It was decided to make seismic measurements in an unexplored region and hide the results of these measurements in a safe. The next stage was drilling. In the area of seismic measurements, on the Kola Peninsula, it was decided to make core drilling to the maximum possible depth. Well, then, following the results of drilling, it was necessary to construct a section of the earth's strata and compare it with the results of seismic exploration.

So did. The well turned out to be about 13 km deep, after which the cable broke, and scientists began to compare geophysics with drilling. Scientific support was carried out by the laboratory of the Baltic Shield (at the Department of Geophysics, Leningrad Mining Institute), and Litvinenko I.V. was in charge of geophysical research.

The result was deafening. There was nothing in common between the seismic section and the geological section obtained by drilling. That is, nothing at all. It was happened exactly the opposite. But when they looked carefully, it turned out that till a depth of 300m the coincidence of the results was 100 percent.

And when they looked even more closely, it turned out that the seismic survey was performed when the drilling had already begun and reached 300m. Well, the obvious theft! Theft of drilling results.

And, as usual, the result of the seismic survey was pulled up to it. And what to do with it? Bury the seismic survey? The participants of the international project did not raise a hand to this. Yes, they would have no one allowed. And they decided to secret the results. From whom? From sponsors? From those who finances the seismic survey? ...

Well, what to do? After all, seismic exploration is so simple, logical, obvious. If we strengthen the mathematical frames that develop her theory, maybe something will finally work out ... And we strengthened it. There are a lot of maths now. And the fact that mathematics without experiment is dead, it seems, was decided to take into account as follows.

For this, a laboratory was made for modeling seismic data. Headed her Karaev Nazim Algeydarovich. Doctor, professor, author of 150 scientific papers and 12 monographs ... I do not know what research he did in his laboratory. But now I can say for sure that there is not a single experiment that would confirm the idea of seismic exploration on at least one point. But he allegedly had ...

Well, if Karayev came, let's say, to our results, who would let him publish them? ...

II–2 Spectral-acoustic flaw detection

As mentioned above, the number of natural frequencies of a resonator object is equal to the number of its dimensions. Thus, a rectangular resonator sample, having three sizes (thickness a, length b and width c), in accordance with Fig.11, has three natural frequencies: f0a, f0b and f0c:

$$f_{0a}=V/2a;\ f_{0b}=V/2b;\ \ f_{0c}=V/2c$$

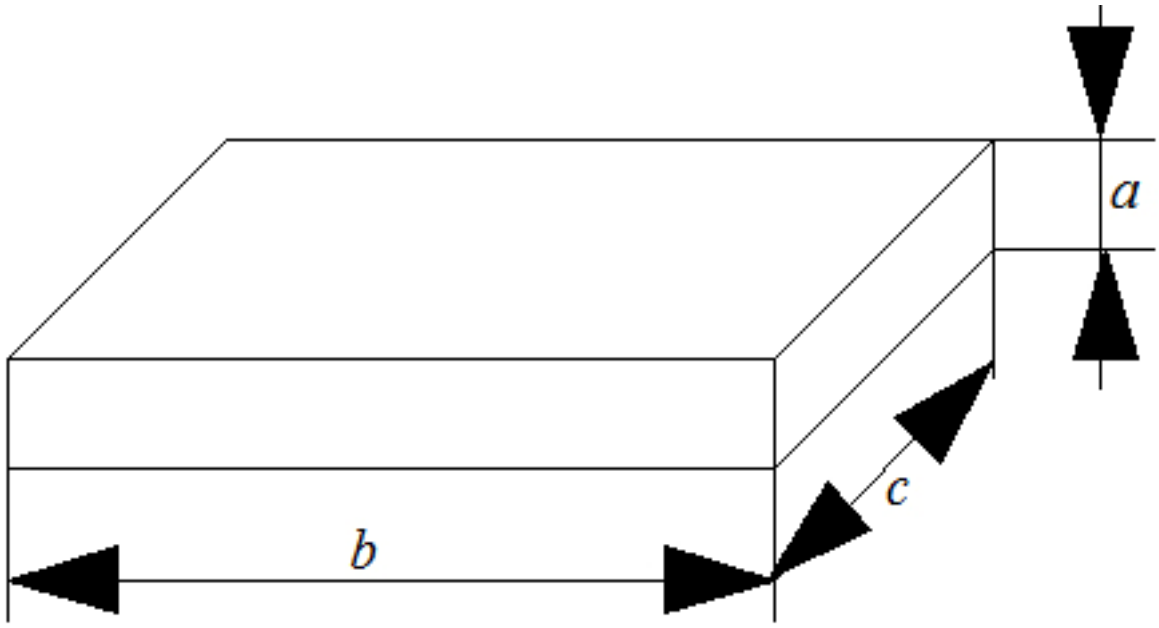

Fig. 11

In this simplest case, it is possible to identify hidden cracks that are not detected by any other method. Thus, in the manufacture of granite rectangular parallelepipeds (like monuments), the presence of a number of natural frequencies, more than three, indicates the presence of hidden cracks in the workpiece. In the event that it is undiscovered microcracks, then the product is destroyed in the manufacture only at the very last stage of processing, during polishing.

The method of spectral-acoustic flaw detection was tested for various cases.

1. For flaw detection of steel products of a very complex configuration (automatic couplings for trains).

In some department of the car-repair plant, 15-20 automatic couplings were brought for us. It was known that one of them had a defect, and everyone was wondering if we would see it. We glued by beeswax to each automatic coupling to the same place a small geophone, and inflicted a light blow to the same place on each automatic coupling.

Typically, flaw detection reveals a specific defect. With spectral-acoustic flaw detection, they strive to identify a product whose spectrum differs from the spectrum of a deliberately high-quality product.

When working with automatic couplings, we identified one automatic coupler with a different spectrum, and it really was defective. The whole procedure took no more than 20min.

The manual was shocked, and we were told that the examination of each automatic coupler takes about 8 hours. During this time, they make about 50 x-rays, and then compare them. Working with X-rays is very harmful, people get milk and some kind of increase in vacation. The X-ray machine works for no more than 6 months, after which you need to go to Kurgan, certainly by car (!), In order to change it to a new one.

From our development refused, because it ... is much cheaper.

2. For the same reason, the Hermitage leadership refused our services when searching for moves (so-called fire) in the walls for using them to provide the premises with uniform heat. Quite by chance we were able to demonstrate the high efficiency of the method, but preference was given to the Giproteatr organization, which solved this problem by drilling the walls of the Hermitage (!). Drilling the walls of the Hermitage turned out to be more expensive than our non-destructive method, so, of course, a salary increase is a good reason to drill its walls.

3. For the same reason, the management of the enterprise “Lenbummash No. 2” refused our services for the defectoscopy of granite blocks. The problem here is the following.

Making granite shafts for papermaking machines is a very long, expensive operation. The workpiece is first chipped off from the rock, then treated roughly, then drilled along the length, then polished and, finally, polished. If there is a microcrack in the workpiece, then the shaft

collapses only at the final processing stage. The efficiency of shaft processing is very small. It is not uncommon that the processing lasts for years, but at the end, during polishing the shaft falls apart.

When testing our technique, we discovered a microcrack even before the start of processing, that is, immediately after the workpiece was cut from the rock. We showed the place where we found the microcrack, and later it was confirmed.

Our method of spectral-acoustic flaw detection promised to give huge savings in the manufacture of granite shafts for paper machines. But suddenly a craftsman was found who used the Druzhba mine seismic station to solve this task, and the management of the Lenbummash-2 enterprise preferred this seismic station.

True, in fact, this seismic does not give any results at all. Neither in mines nor on the surface. But the craftsman appointed for the use of this seismic station a very round sum, which was quite enough for both the craftsman and the management of the enterprise. At the same time, the number of marriages has not decreased, but is this really the main thing? ...

I do not rule out that someday in this country something will change, and research methods will be used not only to keep the leadership in your pocket, but also to use them for their intended purpose.

II–3 A LITTLE ABOUT SCIENCE

The head of the department of seismology and seismic exploration at LOMI (Leningrad branch of the Steklov Mathematical Institute, USSR Academy of Sciences) was Petrashen Georgy Ivanovich. It so happened that at some point it turned out that the names of my and his publications coincided. And I called him for help, or at least a consultation. The fact is that our publications about the physics of elastic oscillations with him, having the same name, proved completely different things. How to be?

It was a wonderful person. Unconditional authority in the field of mathematics and the only person who undertook to deal with what I did. It took us a month to go with him. He came to my laboratory at the Mining Institute, and we together with him did the laboratory work that my students worked at.

As a result, he said that he did not see any mistakes from me, but the acoustics and seismic indeed should be started from scratch. Well what can I say! After so many years of being in complete idiots hear that from Petrashen !!

But at the same time, he added that he was too old to deal with this topic. He was only 72 years old ... After some time i found out that the reason for his unwillingness to deal with this topic that he would be immediately retired for it.

It so happened that after this I learned about some features of Soviet science. And all these features are now Russian science. I wrote a lot about this in my works, but it is so important for young people who want to devote their lives to science that I will repeat it again.

So, so that they know, the main requirement for the dissertation is the lack of something new in it. This requirement has several implications. If there is nothing new in your dissertation, then it is inevitably fake. After all, in order to protect it, you need to submit documents about its novelty and its significance for the national economy. And it means that these documents are inevitably false. And this is a criminal case. Having defended such a dissertation with such implementation documents, you will live for the rest of your life with the fear of exposure.

Can a person with fear in his subconscious do something new? Never! And he will never be able to admit his own forgery either. By agreeing to this, he himself as it were castrated in terms of scientific abilities.

Over time, he will become a member of some academic council, and in the dissertation of any other young man, he himself will not allow anything that is unfamiliar to him. In short, nothing new.

About such a discipline, as exists in science, in the army can only dream of. If a person gets into this community with independently thoughts, his days in science will be numbered. After all, if you have a status no higher than a junior scientific officer, you are taken to work and dismisses you from work the personnel department . And if higher, then the functions of the personnel department are performed by the Scientific Council. The Scientific Council takes all its decisions collectively. But by the will of the chief. And just try not to vote the way your boss wants ...! ... This Damocles sword bangles over every scientist all his life.

There were many very smart boys among my students. They, of course, were taken to graduate school, and in the process of appropriate processing, they turned into stupid capons. Yes, arrogant. Yes, candidates, doctors, but scientific eunuchs.

The simplest treatment is that an aspirant is given an impossible task. He works on it for the year allotted for this and makes sure that the task is impossible. They is helped to complete the work, he is helped to receive the documents on the implementation, and he protects linden. That's all. And from the clever boy it turns out the executive screw, ready for anything.

Exceptions I do not know.

But I received the strongest blow from a person with the reputation of a very intelligent person who held the highest positions in our government and even pretended the office of president. By chance, I formed a connection with him through his referent, who had a geological formation. Even without having listened him report on our capabilities, he stopped him with the words: "Domestic developments are not even considered." There is no prospect for a country where its own leadership so treats domestic science like this.

I have thought many times about this occasion. I think that our rulers distorted their perception by the fact that our entire history, in fact, is the story of the theft of everything - technology, science - from the West.

Theft and lies are the strongest oxidants. And this is our foundation ...

II–4 WORK WITH MINING EQUIPMENT

The first apparatus (“Resonance”) for determining the structure of the roof in the mines was made about a week after it was discovered (in 1977) that the rock layer was, by acoustic properties, an elastic oscillatory system.

I taught then a course in mining geophysics for students and at the advanced training department of the Mining Institute for mining geologists. I lectured in the winter, and in the summer I traveled around the mines. I remember this time with pleasure. I have never met such an interested and friendly audience anywhere else. They ordered me lecture topics, in accordance with their production problems, invited me to their mines, where they showed their special conditions, which we studied with them using our equipment.

And there was not a single mine, wherever I saw something new for me, some conditions that I had not yet seen. In the meantime, the production of Resonance equipment was set up in Donetsk, behind which there was a huge queue. By 1993, about 200 coal mines were equipped with this equipment. And, most importantly, in those mines where geologists used our equipment, there was not a single accident due to the sudden collapse of rocks. Rocks breaks were, but they were predicted.

From 1977 to 1993 (16 years), we worked with “Resonance” equipment in mines in many coal regions of the USSR. It was found that:

1. The collapse of the roof rocks occurs in areas where the roof rocks have a thin layer structure;

2. Low-layeredness can take place in rocks of any strength, and it is not at all necessary that the fine-layeredness be due to the alternation of rocks. There were cases when the fine-grained strongest sandstone had f-15 at Protodeakonov.

There were cases when strong sandstone lay in the roofing, but in some place it was a thin layer, and it was there that the roof collapsed. This was a mystery, which was solved only a few years later.

In 1993, the leadership of the LGI terminated our agreement with the association Yuzhkuzbassugol and fired everyone who worked under this agreement to reduce staff. We lost access to the mines...

II–**5** TZ detection

Before completely leaving geophysics, in 1993 we decided to make a trial section of the earth's strata by spectral seismic survey from the surface of the earth. For us, this was the beginning of the digital era. The equipment was primitive, but already digital. Signals were recorded on an analog portable tape recorder. Digitization of signals was done in the office.

We were sure that we would fail. We have worked in mines at great depths before. There was a well litofitsirovannyrock massif, and its structure was well observed on the outcrops. Here, close to the surface of the Earth, these sandy loams, loam ... It did not even want to be called rocks.

As a profiling line, the Peat Road (St. Petersburg) was chosen (according to the advice of geologists), from Serafimov cemetery to Bogatyrsky Avenue, on a lawn, near houses, only about 1 km. Profile pitch was 5m. The spectral transformation was carried out with the help of Matlab. I have this profile preserved, but the quality was terrible, and I try not to show it.

Sluggish horizontal stratification was observed on this profile, which is normal for sedimentary rocks. But at the same time, at approximately the same distance from each other, four obscure objects in the form of funnels were clearly observed, with their tips down.

We returned to Peat Street to see what these funnels correspond to. What we saw turned our whole future.

Each of these craters was located next to the house, with clear signs of destruction. These signs are vertical and sub-vertical cracks tearing the brickwork, as well as oblique cracks between the corners of the window covers. All other houses had no such signs.

It was clear that these funnels can serve as prognostic signs of the destruction of engineering structures. But the question arose: what are these objects, say, in a geological sense?

The geophysical method and apparatus for implementing this method are now known as spectral-seismic survey profiling (SSP).

Figure 12 shows 3 typical example of such craters. These facilities have centers at 12th, 45th and 66th meters.

These objects may be single-storey or may be multi-storey.

Radon survey showed that a high level of radon is observed over each funnel-shaped object. According to geologists, this gives us the right to call these objects zones of tectonic disturbances. We allowed ourselves to give this object this name in abbreviated form - TZ.

As it turned out later, ZTN is a very important object for all earthlings. I have written many articles about the properties of ZTN [7, 8, 9], and an entire chapter in the book [10] is devoted to them. Despite the fact that geologists mention this object, its identification and mapping is possible only with the help of the SSP.

I think that other methods could not reveal ZTN, because they did not notice any of their properties. But these properties turned out to be very much, and they became known only through the MTP. And then, according to the definitions of geology and geophysics, a zone of tectonic disturbance or, in other words, a fault occurs as a result of movements (displacements) of tectonic plates, an increase in tectonic stresses, and the like. But these are all absolutely speculative substances that are not defined in the experiment, and, therefore, they should not be mentioned.

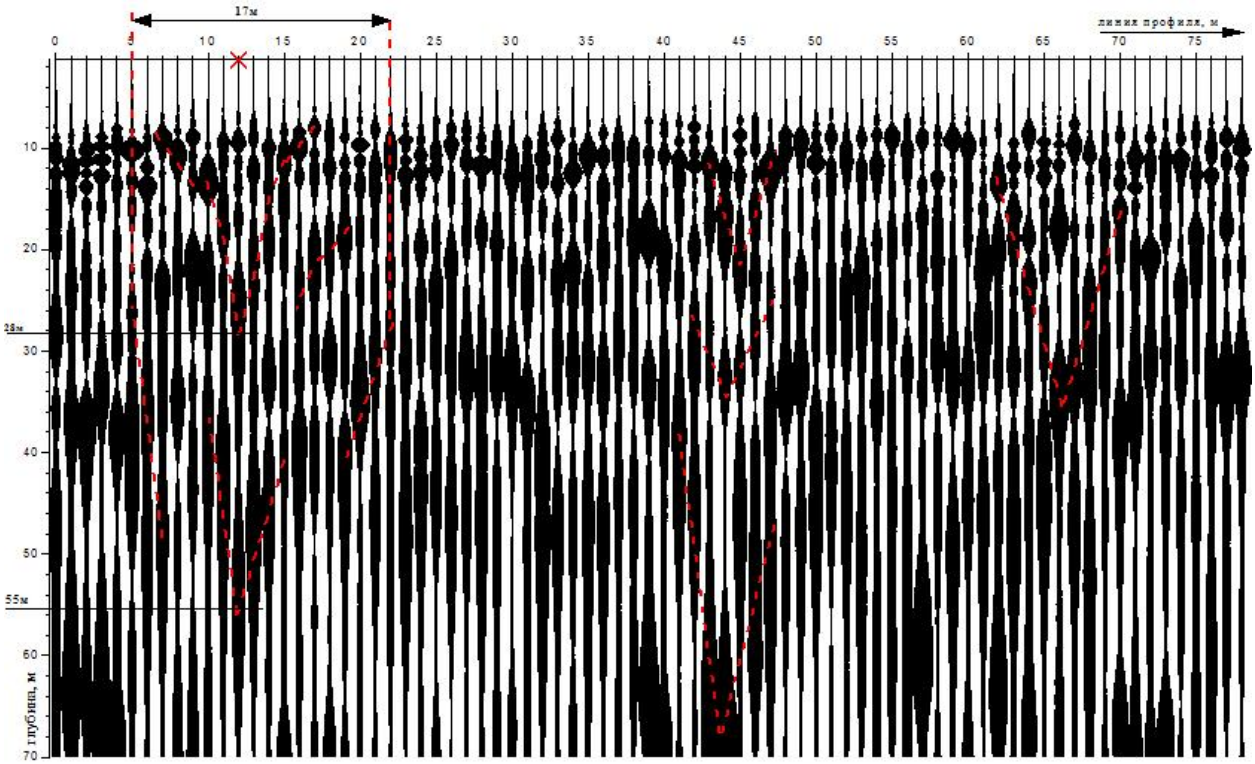

Fig. 12

During the 26 years that have passed since the first detection of TZ (since 1993), we have seen thousands of these objects. And all of them in appearance were either a V-shaped object, or one forming a V-shaped object. Most often, these are multi-storey objects, such as an object with a center about 12 meters of the profile in Figure 12.

The action of TZ is very versatile. Now you can hear in the latest news about the struggle of the city services of Moscow for the smooth laying of tiles on the pavements of the pavements. The tile very quickly after laying becomes uneven. The scandals begin, the tilers are fired, but everything repeats. In some places, the tile is laid for the third time. In fact, the reason for the presence of a large number of TZ. The tile falls directly in these zones. And asphalt will also behave, but not so quickly respond to the action of these zones.

Of course, from the very beginning after the discovery of TZ, I was haunted by many questions. How could such objects form in the Earth? How deep are they spread? What do their guides correspond to (when observing them on outcrops, in mines) and by what method can they be checked? Is this funnel object always vertical? And many, many other questions. But life itself disposed of, giving us from the very beginning information about the properties of TZ. As the study of their properties was carried out, answers to the questions arising in this case also appeared.

Tracing now the process of developing knowledge from detecting EOS to detecting TZ, I myself am surprised at how logical and consistent this was. I then began to understand that to discover at the end of the twentieth century a previously unknown geological object is the same as discovering a new race of people on Earth. Several intermediate physical effects were intertwined with this process, and in the absence of any of them we would not have detected TZ.

II–6 TZ PROPERTIES

The very first property of TZ was discovered as a result of the very first profiling along the Peat Road. On the kilometer profile, 4 V-shaped objects were found, and each of them was located in close proximity to an engineering structure with signs of destruction. Can we assume that the presence of TZ under an engineering structure is a sign of impending destruction?

This is a very important question. The fact is that always, at all times there have been cases of sudden and seemingly unreasonable destruction of engineering structures. At the beginning of the 19th century, in connection with the beginning of the construction of railway lines and the

construction boom that arose because of this, it was discovered that the cause of these destructions is geological in nature. It was discovered as follows.

With the sudden destruction of the house, what was left of it was demolished, and a new one was built on this site. However, after a while, the new house collapsed, and the neighbors stood without any signs of destruction. The same thing happened with the railway embankment. If the railway embankment was destroyed, then no matter how repaired, it would still collapse on this very spot.

And the whole world began to search for the geological causes of sudden destruction of engineering structures. A scientific direction was created, which is called engineering geology. The idea of the method, which should reveal the reasons for such damage, was that prior to the construction of engineering structures, control drilling was done at several points around this structure, and if it suddenly collapsed, then repeated drilling was done at the same points, and by researching the results of drilling, they looked for anomalies.

By the middle of the twentieth century, it became clear that this did not work, and this research was ceased all over the world. The exception was Russia. Here, on the contrary, the number of engineering-geological organizations is increasing. In Moscow there is a huge parent organization, and each city has its own organization, one way or another called engineering-geological. Maybe Russian scientists found the reasons for the sudden destruction of engineering structures? No, they found a way to get paid for doing nothing.

The scheme of this exciting employment is as follows. If you are a builder, then before the construction of the building you are obliged to receive a conclusion that you can proceed to construction where you are entrusted and in the way that the architects decided. In order to get this conclusion, you must pay for it to the engineering and geological organization. And on what basis does this organization issue such a conclusion? Just has the right. They do not have any technical means to predict the destruction of this object.

Technically, it looks like this. The only research that needs to be done to give the required conclusion is the drilling of a certain number of wells according to the project. It so happened that I participated in these works, and I can testify that these drilling operations are rather strange. First, the number of wells is no more than 20% of the number of a given amount according to the project. And secondly, the geological journal contains data on the results of drilling before the start of drilling.

The cost of the required conclusion is approximately 10% of the value of the entire construction. But this is not terrible, since the residents of the house being built themselves are paying for it.

I reported this story at several conferences, calling everything in my own words. But the reaction was the most shameful. First, all these engineering and geological organizations do not even know that they were created in order to predict possible man-made disasters. And when I say that the factor determining the likelihood of these disasters is finally discovered, it only causes laughter.

On the basis of my own experience, I was convinced that the most logical and consistent property of people is the Luddite complex. But I am convinced that, over time, the mapping of TZ will be widely used to predict man-made disasters due to geological factors.

And further. In addition to the so-called engineering-geological end engineering-geophysical work, organizations, etc., have arisen. When I saw a team on Facebook that positioned itself as an engineering-geophysical one, I was generally delighted. Because having colleagues is good. The fact that no one but me in the whole World can predict technological disasters of geological origin is not good. Well, I, in the simplicity of my soul, addressed him with the question of what type of disaster they were predicting.

In response, they promised to beat my face. No comments…

But, I must say, there is still the opportunity to become familiar with another method used to predict man-made disasters. I mean the instrument "String". Its counterpart is the "Arrow. This equipment is located in the minibus. The idea of measurement is as follows. The seismic

receivers located in the equipment set are mounted on the walls of the house under study. After that, one of the walls of the house is hit by hit. The resulting shock signal is recorded, processed, and we get information about the condition of the house.

And everything would be fine, but for all the time of its existence this equipment has never given a warning of destruction. This equipment is acquired by the Ministry of Emergency Situations in order to be able to give the information that is required ...

I was familiar with the developer of this equipment, Professor, Doctor of Technical Sciences Chichinin Innokenty Safyanovich. In his team were only mathematics. He understood that without empiricism, mathematics was dead, and when he got acquainted with my developments, he understood that this equipment in the form in which it exists would not give information. But in 2016, Chichinin died, and “String” (“Arrow”) began to be produced for the Emergency Ministry ...

During construction, there is always the possibility that the supporting structures of the future structure will fall into TZ, and the structure will inevitably collapse. The builders claim that the number of such problem structures is about 4% of the total number of structures erected. Especially often this happens with bridges. The fact is that the river beds mostly pass through the chain of TZ. This is natural, since it is easier for the river to pierce its course through the loosened rocks. And it often happens that the bridge supports fall into TZ.

A few years ago (under Luzhkov), during the construction of a bridge across the Moscow River, right in the middle of the river, the supports hit into TZ and parted, and part of the span when it was laid fell between the supports.

Often the extreme support of the bridge, which is located on the coast, gets into TZ. And then this support has to be repaired during the entire service life of this bridge. Such, for example, is the fate of the Alexander Nevsky Bridge, St. Petersburg, whose left support has been crawling from the very beginning of its operation.

We once collaborated with the organization Lengiprotrans, and we happened to examine the bridge piers on the Bovanenkovo-Labytnangi gas pipeline. There, all the bridges have one extreme support, which “crawls” precisely for this reason. It was then that I learned that such a story happens to most of the bridges in the whole World.

Therefore, I pay great attention to all reports on the status of the Crimean Bridge. It cannot be that not a single support of such a long bridge would hit TZ.

II–7 ABOUT THE MECHANISMS OF DESTRUCTIVE ACTION OF TZ

From the first day, as we discovered that any engineering structure that turned out to be at ZTN, is being destroyed, the question arose of where does the impact come from, leading to destruction.

Figure 13 shows a photograph of the port management building in Petersburg.

I can not imagine what efforts should be made to bring the house which is not yet old to such a state!

Fig. 13

But if the destruction of a house in the port could be explained by a large weight of snow, how could ruined so small garage shown in fig. 14?

Fig. 14

For some time, when I gave reports at construction organizations, held seminars, I asked the listeners the following question. what effect should be made on the engineering structure to arise such vertical and sub-vertical cracks to form in masonry? I did not receive the answer to this question.

The answer came from surveyors. They found out that on the surface of the Earth there are zones in which there is a kind of ground motion. These oscillations have a very low frequency (the oscillation period is minutes) and very large amplitude values - up to 10 cm and even more. This pulsation is a source of error for surveyors.

As it turned out, the zones of this pulsation (this phenomenon is called planetary pulsation) are nothing but zones of tectonic disturbances. And now let's see what happens if there is a part of even a very solid foundation of the house within such a zone. One part of the house will pulsate with TZ, and the other, which is outside TZ, will not pulsate. That is, the foundation will

undergo alternating bending stress. No material can withstand such effects. Moreover, the stronger the basement material, the more damaging this effect will be. It is known that reinforced concrete holds enormous loads with direct compression, and it does not hold flexural loads, and especially alternating signifiers.

The nature of the destruction of the structure depends on the ratio of the area of TZ and the area of the foundation, as well as which parts of the foundation are lean on TZ.

I once witnessed the battle of the chief engineer of one of the mines in the city of Gukovo p / o "Rostovugol" with the forces of nature. There was on the coal lay a very powerful (approximately 10m) rock layer, represented by the strongest sandstone. In principle, it is not necessary to strengthen the roof in such conditions. But in one place the roof collapsed, and it was impossible to keep it. The chief engineer of the mine decided to "fight" with the forces of Nature. According to his instructions, they were made tablets, as they were called, from reinforced concrete, measuring 1 m × 0.5 m × 0.25 m, and they laid the developed space in the zone where the roof could not be kept. Just a few days later, from the place where the tablets were placed, a loud crash began to be heard, and the tablets began to collapse.

As the miners said, the pills were as if chewed by Increased rock pressure combined with the planetary pulsation. Then I, of course, did not understand anything, but when we began to work from the surface and saw how the engineering structures were destroyed, I remembered this mine. This destruction was caused by a planetary pulsation in TZ. It was then that I understood where the lamination in homogeneous, strong rocks comes from in the mines. It occurs as a result of the pulsation in rock in TZ.

As a result of the constant increase in pressure in the core of the Earth in crust of Earth cracks are formed or existing cracks expand. The process of cracking itself is manifested by planetary pulsation. I have long been searching for why the ripple looks exactly like a sinusoidal process. Well, how else could it be if the thickness of the Earth is collection of objects-resonators ... After all, being on the trampoline, whatever movements we would do, they would still have a harmonic character.

This planetary pulsation is the main mechanism for the destruction of both engineering structures and the rocks themselves. And the zones of these destruction are TZ.

Now with regard to the destruction in ZTN of the rocks themselves. With this phenomenon, drillers are most often encountered. If a well enters such a zone, the drilling conditions differ sharply from standard ones. The well goes along already destroyed rocks. Consequently, the output of rocks will be minimal. And sometimes, at all zero. Often a drilling tool just falls a few meters.

It is impossible to verify this by documentary, because, since this cannot happen, these facts are carefully hidden.

II–8 ABOOUT ORIGIN OF TZ AND WATER ON EARTH

According to the hypothesis Larina V.N. [11], as a result of the radioactive synthesis reaction constantly occurring in the Earth’s core, there is a constant increase in pressure and temperature. An increase in pressure leads to the occurrence of cracks and to the expansion of already existing cracks in the Earth’s crust. These cracks run strictly vertically from the core to the surface of the Earth, and the products of radioactive synthesis reach the surface through them.

Also, according to Larin's hypothesis, the prime material of any space object (including our planet) is hydrogen. Thus, the main material in the core of the Earth is hydrogen. As a result of the constantly proceeding radioactive reaction, a high temperature and pressure are constantly maintained in the core. In the presence of oxygen in the Earth’s crust, oxygen with hydrogen synthesizes water.

This mechanism of water formation on Earth explains from where on the originally dry planet there is so much water. Synthesized in the perinuclear space water through cracks in the crust enters the Earth's surface in the form of numerous springs. Water enters the surface of the

Earth also through volcanoes. Relatively recently, it was found that 95% of a volcanic eruption product is water.

In 1997, we found water for the first time. Geologists approached us. They already knew that we often see funnel-shaped objects on SSP-cuts. Apparently, this is how vertical cracks in rocks peep out. This is on the one hand. On the other hand, geologists have the concept water of fracture type (this is their terminology). They know that where granite approaches the very surface of the Earth, spring water can be obtained from vertical cracks. The only problem is that visually vertical cracks cannot be identified.

Geologists turned to us with a request to find a vertical crack in granite, the roof of which comes to the surface in the urban-type settlement of Sovetsky, Vyborg district, Leningrad region. There was built the hotel "Chaika", for which was necessary water.

We found a funnel object on the territory indicated to us. In the center of this object was drilled, and with quite insignificant depth (something, near, 10 meters), water gushed. The water went spouting, that is, the fountain. The fountain rose 2-3 meters. Judging by the composition, it was spring water.

Such sources, where the water comes out as a fountain without any pump, are called artesian, in honor of the first recorded case of a self-pouring well in the XII century, which was located in the province of Artois, in France.

Hotel Chaika receives this water until today, with the same debit. Naturally, I had a question, where does water come from with such constant pressure?

Hydrogeologists with absolute certainty argue that all the water on Earth is precipitation. Rain there, snow ... But if the water is just in the Earth, then where does the constant pressure come from? In Kazakhstan, 1000 meters above the Medeo skating rink, it is unknown how many years water has come out of the Earth under such pressure that the water there is in a state of steam when it leaves the Earth. That is, more than 10 atm. At the highest point of Cyprus, in one of the most anhydrous regions on Earth is the same spring ...

I think that Larin's hypothesis about the origin of water on Earth is one of the greatest hypotheses. This can already be considered a theory, not a hypothesis, because more than 20 years (since we gave water to the Chaika Hotel) has been continuously working on the territory of the Russian Federation for about 10 teams engaged in the search for water. I want to emphasize once again that, in fact, we are not looking for water, but zones of tectonic disturbances, and in the center of them wells or wells receive spring water. Only in the Leningrad region, the number of existing water supply points exceeded 1000.

The water supply points are separated from each other at distances from units to tens of meters. TZ is more or less evenly scattered over the entire surface of our planet, and therefore, there are simply no waterless regions on Earth. This is a very important conclusion against the background of the problems of entire vast territories that are considered waterless.

On the other hand, if you type something like "underground seas in deserts" on a search engine on the Internet, then the waterless deserts will be shown to you (in Egypt, China, Arabia ...). They were drilling for oil, and came across water. In fact, they got into TZ ... that is, the main thing is to find TZ, and almost certainly you get water. "Almost" - because each approximately 50th TZ does not give water. There are TZs that do not give water, but, on the contrary, absorb it. If such TZ is in a reservoir (in a river, lake, sea), then this point is a whirlpool.

Each crack resulting from an increase in pressure in the core of the Earth goes vertically to the surface and reaches the surface of the Earth. On the surface of the Earth, each such crack is recorded on the SSP-section in the form of a funnel-shaped object. In each such fissure, water rises from bottom to top, as well as deep gases from near-nuclear space.

At the birth of the Earth there was no water on it. She was hot and dry. If water rose then, it could only be in the form of steam. Materials that were in a liquid state also rose through cracks running from the perinuclear space to the surface. This is magma, as well as a number of metals in liquid form. Studies conducted in some of the mines in Africa have revealed gold deposits that

reached the earth's surface in this way, through cracks in ZTN at the time when it was liquid. This is easy to understand by the type of core. Gold with rock in such cores is alloyed, which can only be if they rose in the liquid state.

The process of crack formation is both a process of water entry and a process of increasing the size of the Earth. The growth of the size of the planet can also be seen with my own eyes. So, this is indicated by cracks in the asphalt, which are constantly diverging. The cracks occurring on lengthy objects are most obvious. As, for example, on railway platforms.

At the same time, when the rate of increase in the amount of water on Earth increases, the flooding of lowland regions of the Earth begins, and scientists predict global flooding. And when the rate of increase in the size of the Earth is growing - then the same scientists suggest an increased drought.

CONCLUSION

Finally, i got ready to give a description of acoustics as a section of physics, on which I have been working for 46 years.

During this time, acoustics, seismic exploration has evolved from a completely incompetent object, consisting of purely speculative constructions, none of which could be experimentally proven, into a aggregate of methods by which the vast majority of man-made disasters will go away in history.

A special place is occupied by the SSP method, with the help of which it is possible to find sources of spring water. This happened just when the threat of a crisis in obtaining clean drinking water hung over humanity.

And finally, one of the most important tasks that have been solved is the prediction of accidents in mines, mines and quarries. People have long been resigned to the increased probability of injury and death in the mining industry. The miner always went to work without the certainty that he would return home. Now, when the SSP method appeared, this threat has significantly decreased. In any case, if earlier no safety technique could guarantee the preservation of the life of a miner, now only failure to comply with safety measures can lead to trouble.

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