Spacetime & Substance, Vol. 2 (2001), No. 5 (10), pp. 211–225

ETHERAL WIND IN EXPERIENCE OF MILLIMETRIC RADIOWAVES PROPAGATION

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Received August 26, 2001

The phase method of anisotropic media parameters measurement of electromagnetic waves propagation is proposed. The experimental hypothesis check about the existence of such material medium of a radiowaves propagation in the nature, as Aether is executed in eight millimeter radiowaves range. The ethereal wind speed and this speed vertical gradient near the Eath's surface have been measured. The systematic measurement results do not contradict the initial hypothesis rules and can be considered, as experimental imagination confirmation about the Aether existence, as material medium, in the nature.

1. Introduction

The experimental researches of the ground channel phase characteristic of 8-mm range radiowaves propagation have revealed the problems, connected with its model elaboration [1–4]. The model [3] described the possible spatial effects influence, but this idea has not been developed further due to the quantitative divergence between demanded and measured atmosphere parameters. The interference model [4], as a whole, explained the observed effects, but in some cases the qualitative divergence between the calculation and measurement results took place. The further problem analysis has shown that the hypothesis engaging of the radiowaves propagation medium anisotropy has enabled to give the calculation results in conformity with the measurement results. It was supposed that the anisotropy is stipulated by the directional medium motion of radiowaves propagation and this medium flow has the space origin. Some information about such medium motion parameters was taken from the papers [5–7]. The works [5, 6] have been executed in order to the hypothesis experimental check about the Aether existence in the nature as the material medium, which fills the Global space and is the building stuff of all kinds of matter, the motions of which are revealed like physical fields and interactions. In due course the positive work results [5] were widely known, but they have been estimated by scientific community, as error because of some reasons. The hypothesis about the existence of such material medium, as Aether, in the nature wasn't accepted. We'll consider the major work results, which were executed in this direction taking into consideration the long-life and significance of the problem. We'll try to determine the reasons, which have made the physicists of that time consider the work results [5, 6] as error and refuse the Aether concept.

In 1877 D.K. Maxwell noticed, that while the Earth motion through Aether there should be an ethereal wind on the surface, which changes the light speed distributing in Aether. It is known that A.A. Michelson tried to find out an ethereal wind in 1881 for the first time [8, 7]. With the help of a cross shaped interferometer with the length of the optical path about 2.4 m, within the hypothesis of fixed Aether, he expected to receive the bands displacement of an interference pattern, conforming the orbital motion speed of the Earth by the value 30 km/s. However the measured displacement, which corresponded the speed by the value only 3–4 km/s. Michelson related this result to measurement errors and concluded about the initial hypothesis inaccuracy of stationary Aether. However, it is considered in physics almost since that time, that "Michelson experience" has shown in general the inaccuracy imagination about such medium existence as Aether in the nature. Many explorers didn't agree with such matters. The attempts to find out this medium continued, including Michelson himself.

In 1925 D.K. Miller received the optical path of the length about 64 m with a cross-shaped interferometer, as a result of long systematic measurements, that the suspected ethereal wind speed at the altitude 265 m above the sea level (Clevelend) has the value about 3 km/s, and at the altitude 1830 m (observatory Mount Wilson, Pasadena) is about 10 km/s. The motion apex coordinates of the Solar system were determined: the direct ascension 17.5^h, declination $+65^0$ [5].

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The Miller works have attracted the great physicists' attention. The discussion has started about them, in which the influence of possible unaccounted factors on an optical interferometer was discussed first of all. In the work [10] S.I. Vavilov expressed, perhaps, the common opinion formed: "...the Miller's interferometer is so sensitive, that many local influences, considered hard, can be the cause of systematic bands displacement". Here again: "In any case, the experiments repetition in the other place and by the other device is necessary at this situation." It was clear, that the interferometer is required to save the environment parameters from the change affect. The solution seemed apparent - the interferometer should be placed into the thermostat and then into the pressurized chamber together with the thermostat. So it happened, but all the attempts in order to repeat Miller's experiment, except the experiment [11], were performed by the devices, which were placed in metallic chambers. R.D. Kenedy [12, 7] increased the interferometer sensitivity. The device was placed in the pressurized metallic chamber. The measurements were conducted at the same altitudes, as in [5]. The bands displacement was not observed. K.K. Illingwort [13, 7] improved Kennedy's device, but also these measurements showed a zero result. E. Stael [14, 7] placed an interferometer in the metallic chamber, i.e. thermostat, and raised it in an air balloon up to the altitude 2500 m. The required effect was not observed. In 1929 the work by A.A. Michelson, F.G. Peas, F. Pirson appeared [11]. In this experiment, at the same observatory Mount Wilson, the bands displacement of an interference pattern value no more than 1/50 of the expected effect was measured with the interferometer having the optical path length about 26 m, connected with the solar System motion having the speed 300 km/s. In other words, the speed of relative motion of the value 6 km/s was measured. The interferometer has been placed into a fundamental building of the observatory optical workshop for work temperature regime stabilization. The pressurized metallic chamber was not applied. Unfortunately, the problems, which the authors overcame at the experiment execution, were listed in general in this extremely laconic work (1 page). The measured results are presented only in such kind as they were given in the above mentioned work.

The experiment by G. Yoosa 1930 [15] was the last experiment on the ethereal wind detection, which was executed with an optical interferometer. The device was made on the quartz basis by the corporation Tseys, it was hanged in the vacuum-metallic chamber and supplied with photographic registration. The measurement results showed that the required ethereal wind, in any case, does not exceed the value 1 km/s (the device resolving capacity). Miller's measurements should be considered finally as the error ones and stipulated by outside causes after zero work result [15].

In 1933, Miller has marked the shielding property of metal covers in his work [6]. However the scientific community did not react properly to such peculiarity, shown by him in this work, as, perhaps, the positive work results [11], as there was a lot of experiments with zero results obtained with the interferometers, screened by metallic chambers by that time. The physical shielding phenomenon interpretation was given by V.A. Atsukovsky [16] for the first time, having explained it by the fact, that the electrons in metals will create so-called "Fermi's surface".

After 1930 Michelson-Miller's experiment ceased to take a central place in physics. Only in 50 years, there was a capability of the experiment realization, which didn't repeat Michelson's scheme, but being its analogues in the results interpretation sense after the devices appearance, based on completely other ideas (resonators, masers, Mossbauer effect etc.). Such experiments were conducted [17–20]. And again, the common tool error of these experiments was the usage of ethereal wind effects detection of different metallic chambers. They were metallic resonators in [17, 18, 20], lead chamber in [19], since it was necessary to work with a gamma-radiation. The works' authors, perhaps, have not given the proper significance to Miller's conclusions 1933 [6] about the inapplicability of metal boxes in the experiments with an ethereal wind.

Thus, proper checks of Miller's experiments weren't conducted yet until nowadays, in spite of numerous physicists' attempts to repeat his experiments! All his followers carefully screened the devices from an ethereal wind by metal chambers, and, according to A.A.Atsukovsky's image expression, "...it's the same that to make the attempts to measure the wind, which blows outdoors, looking on the anemometer put in a densely close room" ([7], p. 4). The known works until nowadays cannot be ranked as experiments, which could confirm or deny Miller's results, confirm or deny the hypothesis about Aether existence in the nature. The measuring means, unsuitable for ethereal wind effects measurement, were applied in all these works.

The great job for work collecting and analysis, dedicated the ethereal wind problem, was performed by Atsukovsky [7]. The aether model is offered and the aether dynamic picture of the world was designed in his works [21, 22, 16]. The Aether is represented as a material medium, which fills in the global space and has the properties of viscous and compressible gas, it is a building stuff for all material formations. The element of Aether is an amer. The physical fields represent different forms of Aether motion, i.e. the Aether is a material medium of electromagnetic waves propagation. The gradient boundary layer is formed at mutual motion of the Solar System and Aether near the Earth surface, in which the Aether running speed (ethereal wind) increases with an altitude. The ethereal wind apex is northern. It is shown, that the metals have larger aether dynamic resistance and interfere the Aether flows. Therefore metering devices arrangement in metal chambers is inadmissible. The reason of failures is due to it [12–14 etc.]. The work authors [7, 16, 21, 22] consider that the experiments [5, 11] are authentic.

However the positive work results [5, 11] couldn't be considered as final experiment currently, after which the doubts regarding the definite physical concept are removed. The matter is that within modern imagination about the light speed constancy, the fact finding of the Earth and Solar system motion in space availability is not enough to make a conclusion about Aether existence, as material medium, i.e. medium consisting of separate particles. So, Sanyak's known rotary effect and the relative movement, discovered with it, for example the Earth's diurnal rotation [23, 7], in modern physics is interpreted without engaging the Aether hypothesis existence [24]. Essentially, the attempt to show that the discovered motion is conditioned by the Earth relative movement and Aether material medium were made by two explorers: Miller [5] and Staal [14], but both made the essential methodical errors. Miller placed the interferometer at different altitudes and obtained that the speed of the discovered motion raised with the altitude increase over the Earth's surface. There shouldn't be such relation in case of movement in space, without Aether availability, as the material medium flow. However these major measurements, executed in [5], are methodically incorrect: the measurements are carried at different altitudes in time; the measurements are conducted in the environment various conditions (temperature, humidity, pressure, solar radiation, airflows, etc.), the interferometer is rather sensitive to the environment parameters variability; the measurements, strictly speaking, are conducted by miscellaneous devices, since Miller's huge interferometer was disassembled, assembled again and adjusted while moving from Clevelend to Mount Wilson observatory. Therefore, the technique, which Miller applied for speed dependence measurement of the discovered motion from an altitude above the Earth's surface, was unacceptable to make a final conclusion for the benefit of Aether existence, as material medium. Staal tried to apply more correct technique for this problem solution [14]. The optical interferometer mounted on an air balloon, rose up to the altitude 2500 m. The interferometer was placed into the pressurized metal chamber (the thermostat) for stabilization of the working conditions. As it has already been emphasized, the application of metal chambers is completely inadmissible at such measurements. This circumstance was not known at that time. It occurred, that the measured displacement of interference bands corresponds to the ethereal wind speed of 7 km/s with the error of the same magnitude order. The conclusion of the author's work [14]: "We can not discuss Miller's result on the basis of this experimental series, as our measurements accuracy is just on the border of Miller's observations. However we can exclude Miller's effect, raised with the altitude increase." In other words, the motion could be find out, and high-altitude relation of this speed misses completely.

Thus, considering the work lacks [5, 11] and large number experiments availability with zero result, it is possible to understand the physicists disbelieving to the works at that time [5, 11], the results of which indicated the necessity of the fundamental physical concepts change.

Positive results of the data application [5, 6], at the experiments analysis [1-4], detected reasons of unsuccessful attempts to repeat Miller's experiments, showed, that it is necessary to make the experiment again in order of the hypothesis check of the electromagnetic waves propagation material medium — Aether existence in the nature. It is necessary to solve the following problems for this purpose. It is necessary to take into account the lacks, allowed in earlier conducted researches; to apply other measurement methods, which will enable to show the Earth's relative movement availability in the unified measurement act in a single experiment and that the motion is stipulated by the Earth relative movement and the material medium flow of electromagnetic waves propagation and this medium motion has a space parentage. The positive result of such experiment can be considered as the experiment hypothesis confirmation of Aether material medium existence in the nature.

2. Measurement method

The Aether model has been adopted as the initial hypothesis and offered in the works [21, 22, 16] while the experiment accomplishment. The following effects should be observed in this case at electromagnetic waves propagation near the Earth's surface. The anisotropy effect, i.e. wave propagation velocity depends on the radiation direction that is stipulated by the Earth and Aether relative movement, i.e. the medium of electromagnetic waves propagation. The altitude effect, i.e. the wave propagation velocity depends on the altitude above the Earth's surface that is stipulated by Aether viscosity, i.e. the material medium of electromagnetic waves propagation. The space effect, i.e. the wave propagation velocity along the Earth surface changes the value within one day, that is stipulated by the space origin of ethereal wind. Thus as a result of the Earth's diurnal rotation the altitude (astronomical coordinate) of the Solar System motion apex will change its value within sidereal dayowing as for any other aster. Therefore horizontal component of ethereal wind speed and, therefore, the rate of electromagnetic waves propagation along the Earth's surface will change their values within the same term. Therefore, according to the research problems, the measurement method should be responsive to the indicated effects, and provide their

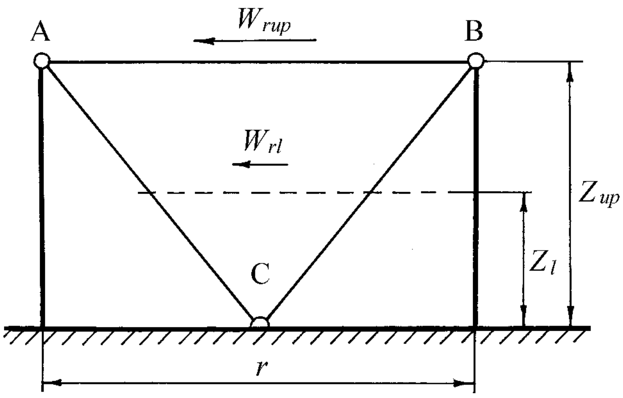

Figure 1: The experience scheme

observation in the unified measurement action.

The method of measurement is applied in the work, based on the reciprocity principle rules in electrodynamics [25], according to which the radiowaves propagation conditions from one point of a radio link to the other are completely those, as well as backwards and this symmetry does not depend on the interspace properties, which is only supposed to be isotropic. If the radiowaves propagation velocity depends on the radiation direction, such space is anisotropic and the reciprocity principle is not applied. The ground radio link of a line-of-sight with a counter radiowaves propagation of a millimeter-wave is used at the method implementation. In this case the main fields formation mechanizm in the acceptance points is the interference of direct waves and waves, reflected from the Earth's surface, i.e. waves, which spread at miscellaneous altitudes from ground [26]. It enables, comparing the wave interference results to find out the development of anisotropic and altitude effects simultaneously in both points. The space effect was found out, as well as in [5, 6], by the results averaging of systematic measurements executed to scale the sidereal time S.

Let's consider the operational principle of the measurement method. The experience scheme is shown in the Fig. 1

The letters A and B indicate the transceiver points of the radio link. Two waves come there at each of these points: a straight line distributing on a pathway AB at the altitude Z_{up} above the Earth's surface, and the wave, reflected from the Earth's surface in the point C. The expansion of a pathway AB is r. The medium trajectory height ACB is Z_l. The arrows indicated as W_{rup} and W_{rl}, demonstrate the radial component direction of the ethereal wind speed, i.e. the component, which is operational along the radio link. Their lengths are proportional to ethereal wind speeds at the altitudes Z_{up} and Z_l. The radio link represents the radio interferometer, which due to the Earth's diurnal rotation turns into the Aether flow. The characteristics measurement method of the radio tracts is applied for observation of the wave interference [27]. The method essence is in the following. The zonding modulation signal I with a carrier frequency f_0 and the frequencies lower $(f_1 = f_0 - F)$ and upper $(f_1 = f_0 + F)$ of the lateral components (F is a modulating frequency) emits from the transmitting point. At propagation each i signal component I receives the phase increment φ_i (the indexes $i = 1, 2$ correspond to the frequencies $f_{0,1,2}$). The adopted signal component with the frequency f_0 is multiplied separately from each of lateral components in the receiving device, and the phase shift $\Delta\varphi_i$ is measured between the multiplication results having differential frequencies. The expression for $\Delta\varphi_i$ looks like

$$\Delta\varphi = (\varphi_0 - \varphi_1) - (\varphi_2 - \varphi_0) \quad . \tag{1}$$

Such phases combination is invariant to the time zero change and received the name "a phase invariant" in the paper [28]. Let's find the value $\Delta\varphi_i$ at a wave interference in the radio link points, shown in the Fig. 1. In this case, the resultant oscillation phase with i frequency can be determined with the following known expression [29]

$$\varphi_i = k_i r + \mathrm{arctg}\frac{R\sin(k_i\Delta r + \Theta)}{1 + R\cos(k_i\Delta\, r + \Theta)}, \tag{2}$$

where: $k_i = 2\pi/\lambda_i$ is the wave number; $\lambda_i = c/f_i$ is the wavelength; c is the radiowave propagation velocity in the fixed Aether $(W = 0)$, in vacuum; R is the module of the reflection coefficient; Θ is the phase of the reflection coefficient; Δr is the propagation difference between direct and reflected waves. As in the experiment $Z_{up} \ll r$, it is possible to consider, that $\Theta \approx \pi$ [29]. Then (2) will be like

$$\varphi_i = k_i r + arctg\frac{-R\sin(k_i\Delta r)}{1 - R\cos(k_i\Delta r)}. \tag{3}$$

Let's designate

$$M_i = arctg\frac{-R\sin(k_i\Delta r)}{1 - R\cos(k_i\Delta r)}. \tag{4}$$

Let's record (3) as $\varphi_i = k_i + M_i$ and we shall substitute φ_i into (1). Allowing, that

$k_{2,1} = k_0 \pm \Delta k, \quad \Delta k = k_0 - k_1 = k_2 - k_0$, we shall receive

$$\Delta\varphi = (M_0 - M_1) - (M_2 - M_0)\,. \tag{5}$$

We'll decompose (4) into Taylor rows in the point neighborhood $k_0\Delta r$ according to the powers $(\Delta k\Delta r)$. Limiting by the first four decomposing members, we shall record:

$$M_1 = M_0 - \Delta k\Delta r M_0' + \frac{1}{2}\Delta k^2\Delta r^2 M_0'' -$$

$$-\frac{1}{6}\Delta k^3 \Delta r^3 M_0''' + \cdots, \tag{6}$$

$$M_2 = M_0 + \Delta k \Delta r M_0' + \frac{1}{2}\Delta k^2 \Delta r^2 M_0'' +$$

$$+\frac{1}{6}\Delta k^3 \Delta r^3 M_0''' + \cdots . \tag{7}$$

Let's substitute the values M_1, M_2, defined by the expressions (6), (7), into (5), we shall obtain

$$\Delta\varphi = -(\Delta k \Delta r)^2 M_0''. \tag{8}$$

Let's calculate the second derivative M_0'', then (8) will be like

$$\Delta\varphi = -(\Delta k \Delta r)^2 \frac{R(1-R^2)\sin k_0 \Delta r}{(1+R^2-2R\cos k_0 \Delta r)^2}. \tag{9}$$

The expression (9) introduces the phase invariant value $\Delta\varphi$ in an interference case in the reception method point of direct waves and the waves, reflected from the Earth's surface distributing on the pathways AB and ACB. For problem solving of the research results of simultaneous values measurements $\Delta\varphi_A$ and $\Delta\varphi_B$, in the points A and B accordingly, we shall deduct one of the other

$$\Phi = \Delta\varphi_A - \Delta\varphi_B. \tag{10}$$

In the considered method Φ is the measured value. According to the reciprocity principle, at the radiowaves propagation in the isotropic medium $\Delta\varphi_A = \Delta\varphi_B$. In this case

$\Phi = 0$. In case of the anisotropic medium the reciprocity principle is not applied and $\Phi \neq 0$.

It follows from (9), that at fixed values Δk and k_0 the value $\Delta\varphi$ depends on R and Δr. In the paper the data about actual values R, i.e. having a place in a radio link, selected for measurements, are obtained experimentally at this radio link characteristics analysis. The information about the value R change range can be found, for example, in the paper [26]. The propagation difference Δr is determined by the radio link geometry, but at the radiowaves propagation in atmosphere, owing to radiowaves refraction, as well the value Δr depends upon the gradient value g_n of the high-altitude profile of the atmosphere interception factor $n(Z)$ [29]. At the linear (and close to it) relation $n(Z)$ the value g_n in the atmospheric layer $\Delta Z = Z_{up} - Z_l$ can be determined as

$$g_n = (n_{up} - n_l)/\Delta Z, \tag{11}$$

where n_{up}, n_l is the index coefficient of air at heights Z_{up}, Z_l.

The direct wave propagation velocity is $(W_{up} = W_l = 0)$ the velocity of propagation of a direct wave is equal $V_{up} = c/n_{up}$, the wave velocity, reflected from the Earth's surface is $V_l = c/n_l$ in the isotropic case. Then (11), taking into account, that $V_{up}V_l \approx c^2$, can be written like

$$g_n = (V_l - V_{up})/c\Delta\mathrm{Z}. \tag{12}$$

In the anisotropic case $(W_{up} > W_l > 0$, that corresponds the positions of an initial hypothesis) the radiowave propagation velocity is V and its relation to the altitude $V(Z)$ depend on the radiation direction, that is stipulated by the gradient medium flow of radiowaves propagation, i.e. Aether (Fig. 1) available. In this case wave propagation velocities at altitudes Z_{up} and Z_l are

$$V_{up} = \frac{c}{n_{up}} \pm W_{rup}, \qquad V_l = \frac{c}{n_l} \pm W_{rl}, \tag{13}$$

where the sign "+" is applied, when the radiowaves propagation direction coincides the ethereal wind direction, and the sign "-" is applied, when these directions are inverse. Let's put the values Z_{up} and Z_l in (12). If the propagation directions of radiowaves and ethereal wind coincide, we shall receive

$$g_{n+} = \frac{1}{c\Delta\mathrm{Z}}\left(\frac{c}{n_l} + W_{rl} - \frac{c}{n_{up}} - W_{rup}\right). \tag{14}$$

Let's open brackets, then

$$g_{n+} = \frac{n_{up} - n_l}{\Delta\mathrm{Z} n_l n_{up}} - \frac{W_{rup} - W_{rl}}{c\Delta\mathrm{Z}}. \tag{15}$$

Allowing, that $n_l n_{up} \approx 1$, $(n_{up} - n_l)/\Delta Z = g_n$, and $(W_{rup} - W_{rl})/\Delta Z = g_{Wr}$ is the gradient of the ethereal wind speed radial component in the layer ΔZ, the expression (15) can be written as

$$g_{n+} \approx g_n - g_{Wr}/c\,. \tag{16}$$

The first sum member (16) represents the high-altitude profile gradient of the atmosphere refraction coefficient g_n in the layer ΔZ. The second member represents the additional component to g_n, stipulated by the velocity gradient availability in the ethereal wind flow g_{Wr}. At the radiowaves propagation towards the ethereal wind motion, it is possible to receive

$$g_{n-} \approx g_n + g_{Wr}/c. \tag{17}$$

It follows from (16), (17) that if the Aether gradient flow is available, the wave refraction distributing in counter directions, will be different by virtue of $g_{n+} \neq g_{n-}$.

Let's consider the offered measurement method action with reference to a concrete experimental radiolink, taking into account the features of hardware implementation of this
method now. Let's estimate the values of probable hardware and methodical measurement errors.

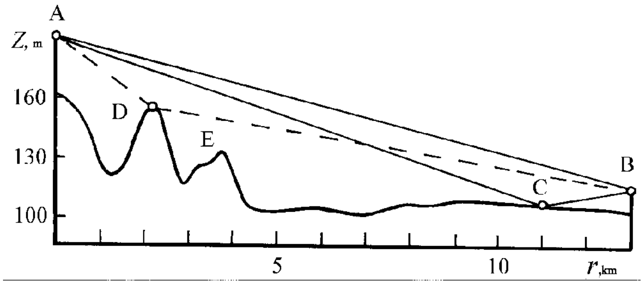

Figure 2: The experimental radiolink profile

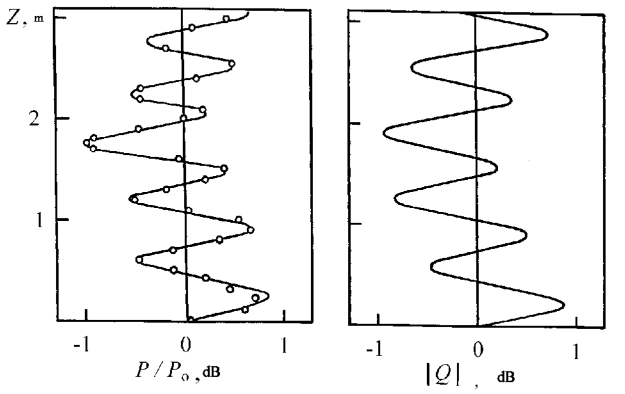

Figure 3: The high-altitude field profile

3. Experimental radiolink

The measurements are conducted with the ground radiolink of direct visibility within 13 km. The radiolink profile is shown in the Fig. 2.

The points A and B are the final transceiver points in the figure. The point A was on the northern side of Kharkov, the point B was in the village Russian Tishky. The aerial of the point A was at the altitude 30 m from the Earth's surface, and the aerial of the point B was at the altitude 12 m. The hill top D, the terrain in the region of the point C and point B have the grass covering. The hill top E is occupied with forests. The medium trajectory height is AB overland $Z_{up} \approx 42$ m. The lumen value above the top D, definited by geodesic method, is $H_1 \approx 25.3$ m. The interval from the point A up to the top $Dr_1 \approx 2200$m. The azimuth of a radio link, measured in the point A regarding the meridian, $\alpha \approx 45^0$. To specify the fields formation mechanizm in radiolink points, the vertical field structure is measured in the point A. The measurements are executed in summer, in August. The radiation was conducted by the aerial of the point B on a carrier frequency of this point zonding signal. The vertical probing is executed by consequent rise of the auxiliary receiving device supplied with the aerial of rather broad directional diagram ($\approx 10^0$). The rise started from a aerial arrangement level of the point A. The measurement results are shown by the points on the left-hand piece of the Fig. 3. The continuous line approximates the view of measured field structure. The power P of the received signal in decibels regarding the reference level P_0 is plotted on an abscissa axis. The height of the auxiliary receiving device in meters is plotted on an ordinate axis.

As it is visible from the Fig. 3, the structure of a high-altitude profile contains two components mainly. The first structure is presented by several change terms, the second is presented only by the part of its term. The measured structure can be described by three waves interference: the direct wave (distributing on the pathes BA), the waves, reflected from the top D (on the path BDA), and the waves, reflected from the terrain in neighborhood of the point C (on the path BCA).

The problem solution of a field calculation at several waves interference is described in the work [29]. The factor attenuation module is determined by the following formula at vertical probing

$$|Q(Z_a)| = \left\{ \left[1 + \sum_{j=1}^{J} R_j \cos\gamma_j (Z_a) \right]^2 + \right.$$

$$\left. + \left[\sum_{j=1}^{J} R_j \sin\gamma_j (Z_a) \right]^2 \right\}^{1/2}, \qquad (18)$$

where Z_a is the auxiliary device uprise height; J is the interfering waves quantity; j is the wave number, reflected from j point on the Earth's surface. The phase shift $\gamma_i(Z_a)$ between a straight line and j waves is

$$\gamma_j(Z_a) = 2\pi\lambda^{-1}\Delta r_j(Z_a) + \Theta_j. \qquad (19)$$

The propagation waves difference at $g_n = 0$ is

$$\Delta r_{0j}(Z_a) = \frac{[H_j + \Delta H_j(Z_a)]^2}{2rq_j(1-q_j)}, \qquad (20)$$

where H_j is the lumen value above j reflection point at $g_n = 0$; $\Delta H_j(Z_a)$ is the additional element to the value H_j, which depends upon Z_a; $q_j = r_j/r$ is the relative coordinate of j of the reflection point; r_j is the interval from the point A up to j reflection point. The lumen value at $g_n \neq 0$ is determined by the expression

$$H_j(g_n) = H_j - 0.25r^2 g_n q_j (1-q_j). \qquad (21)$$

The additional element value $\Delta H_j(Za)$ is

$$\Delta H_j(Z_a) = (1-q_j) Z_a. \qquad (22)$$

The calculation result is given on the right piece of the Fig. 3, executed on the formulas (18)-(22). The following parameters values of reflection points are adopted at calculations: $\Theta_{1,2} = \pi$; $r_1 = 2200$ m; $H_1 = 25.3$ m; $R_1 = 0.07$; $r_2 = 11000$ m; $H_2 = 24$ m; $R_2 = 0.04$; value $g_n = -5.5 \cdot 10^{-8}$ m^{-1}. The values R_1 and R_2 are obtained from the data of the field vertical probing (left-hand piece of the Fig. 3). Their rather small values (for example, in comparison with the work data [26]) are stipulated by the following features of reflected waves formation in an experimental radiolink (Fig. 2). It is: the waves divergence at reflection from the domed top D; the segment C was irradiated with a side lobe of the antenna point B direction. It is visible from the Fig. 3, that the calculation results will be agreeed with the measurement results as a whole. The differences available can be explained by those that the calculation is executed in the supposition about the independence g_n from Z_a.

At measurements realization, foreseen by this work problems, the probing signals transmission in the points A and B was implemented by the aerials with directional diagrams width $\approx 0.5^0$. In this case the top D was outside of the aerial chart main lobe of the point A. Therefore the signal values, received in both points from the top D directions, were much less (on 17...20 dB) signal values, received from the point C directions. (As it was marked, the auxiliary aerial with the directional diagram width about 10^0 was applied at vertical probing and the top D was in a main lobe of such aerial). Therefore further estimations were executed within the following supposition. The signals received in the points A and B, represent the wave interference results, which come to these points on the pathways AB and ACB. The following parameters of a reflecting segment are adopted for calculations: $r_2 = 11000$ m; $H_2 = 24$ m; $R_2 = 0.04$. (As only this segment is considered below, the indexes writing is omitted and considered, that $H_2 = H$; $R_2 = R$; $q_2 = q$; $\Delta r_{02} = \Delta r_0$).

We shall substitute the value H to (20), defined by (21) for the relation calculation Δr from g_n, we shall receive

$$\Delta r = \frac{H^2}{2rq\,(1-q)} - \frac{rH}{4} g_n + \frac{r^3 g_n^2}{32} q\,(1-q)\,. \qquad (23)$$

The first member (23), according to (20), represents the value Δr_0 at $g_n = 0$, $Z_a = 0$. The second and third members depend on g_n. Thus within the change range g_n, peculiar for atmosphere [30-32], the value of the third member does not exceed 0.01 from the second value. The values Δr_0 and $rH/4$ are determined only in geometrical parameters of a radiolink. In this case, neglecting third member in the expression (23) and having designated $rH/4 = d$, we shall receive

$$\Delta r \approx \Delta r_0 - d g_n\,. \qquad (24)$$

It follows, that anisotropic effects and altitudes result in the components occurrence to g_n by value $\pm g_{Wr}/c$ in an anisotropic case ($W_{up} > W_l > 0$), from (16), (17). Let's substitute values g_n, defined by (16), (17) in (24). Let's receive, that the propagation difference at propagation directions concurrence of radiowaves and ethereal wind is

$$\Delta r_+ = \Delta r_0 - d\,(g_n - g_{Wr}/c)\,. \qquad (25)$$

It is at a radiowaves propagation towards the ethereal wind motion

$$\Delta r_- = \Delta r_0 - d\,(g_n + g_{Wr}/c)\,. \qquad (26)$$

It follows, that $\Delta r_+ > \Delta r$, $\Delta r_- < \Delta r$ and $\Delta r_+ \neq \Delta r_-$ from (25), (26). The difference in these values is determined by the velocity gradient of the ethereal wind value g_{Wr}.

We shall estimate the possible value g_{Wr}. The estimations will be executed for a case, when the horizontal component of the ethereal wind speed receives the maximum value. It should be observed at the moment of the ethereal wind lower transit apex (the apex crosses the meridian in the bottom point). In [5], the declination of the ethereal wind apex $\delta_M = +65^0$ is determined in an equatorial system of astronomical coordinates. The index "M" means the measurement place, i.e. the observatory Mount Wilson. Its geographic latitude $\varphi_M = 34^0$ n.l., the altitude above the sea level $Z_M \approx 1830$ m. In [5] the ethereal wind speed in the interferometer plane, i.e. horizontal component of this speed W_M, was measured, it is

$$W_M = W \cos h_M\,, \qquad (27)$$

where W is the value of the ethereal wind speed module at the altitude Z_M; h_M is the apex height in a horizontal system of astronomical coordinates at the latitude φ_M. Resulting in the measured data, obtained by Miller on Mount Wilson and in Clevelend, the high-altitude relation of the ethereal wind speed, presupposing the exponential nature of this relation, can be approximated by the expression

$$W_M\,(Z) = bW_M\,\left(1 - \mathrm{e}^{-\beta\,Z}\right), \qquad (28)$$

where $b = 1.136$; $\beta = 1.16 \cdot 10^{-3}$ m^{-1} are proportional ratios; W_M is the speed values of the ethereal wind, measured in [5, 6] at the altitude Z_M; Z is the altitude above the sea level. The expression (28) enables by the results [5, 6], obtained at the altitude Z_M, to calculate high-altitude speed relation of the ethereal wind $W_M\,(Z)$ at the latitude φ_M. The measurements were conducted near Kharkov, at the latitude $\varphi_K = 50^0$ n.l. The index "K," as well as above, means the measurement place. Supposing, that the nature of high-altitude speed relation of the ethereal wind in this point of a terrestrial globe looks like to the relation (28), we shall write

$$W_K(Z) = bW_K(Z_M)\left(1 - e^{-\beta Z}\right), \quad (29)$$

where $W_K(Z)$ is the horizontal speed component of the ethereal wind at the latitude φ_K, at the altitude Z_M, which can be determined as

$$W_K(Z_M) = W\cos h_K, \quad (30)$$

where h_K is the apex altitude of the ethereal wind at the latitude φ_K. It is possible to receive from the equations (27), (30), that

$$W_K(Z_M) = W_M\cos h_K/\cos h_M. \quad (31)$$

Let's write down h_K and h_M through the apex declination value δ_M and the latitude φ_K, φ_M. Let's take the ratio for transition from the first equatorial system of astronomical coordinates to horizontal ones, [33]

$$\cos h\cos A = -\cos\varphi\sin\delta + \sin\varphi\cos\delta\cos t. \quad (32)$$

Here A is the apex azimuth in a horizontal system of astronomical coordinates; t and δ is an hour angle, and the apex declination in equatorial coordinate system accordingly; φ is geographic latitude of the observation place. In a point of the lower apex transit, as well as for any aster, $A = 180^0$, $t = 12^h$ (in a degree measure $t = 180^0$) [33]. In this case (32) becomes

$$\cos h = \sin(\delta + \varphi). \quad (33)$$

Let's substitute the values $cosh$, defined by the expression (33), in (31). Allowing the latitudes values are φ_K, φ_M and the value defined in [5] the apex declination δ_M, we shall receive

$$W_K(Z_M) = W_M\sin(\delta_M + \varphi_K)/\sin(\delta_M + \varphi_M). (34)$$

Then, allowing (34), the expression (29) will be like

$$W_K(Z) = bW_M\frac{\sin(\delta_M + \varphi_K)}{\sin(\delta_M + \varphi_M)}\left(1 - e^{-\beta Z}\right). \quad (35)$$

The expression (35) allows to calculate high-altitude relation of the ethereal wind speed horizontal component for the latitude φ_K by the work results [5, 6], obtained at the altitude z_M. As the radio link is declined from a meridian with the angle a, the high-altitude relation of the ethereal wind speed radial component in the radio link location, at the moment of a lower apex culmination is

$$W_{rK}(Z) = bW_M\cos\alpha\frac{\sin(\delta_M + \varphi_K)}{\sin(\delta_M + \varphi_M)}\left(1 - e^{-\beta Z}\right). (36)$$

We shall find the high-altitude gradient relation of this speed, differentiating (36) on a variable Z. We'll obtain

$$g_{WrK}(Z) = b\beta W_M\cos\alpha\frac{\sin(\delta_M + \varphi_K)}{\sin(\delta_M + \varphi_M)}e^{-\beta Z}. \quad (37)$$

Let's calculate the anticipated value g_{WrK}. The value $W_{Mmax} \approx 9000$ m/sec represents the average value of the ethereal wind maximum speeds in the work [5], measured during all months of observations. Having put in (37) $W_M = W_{Mmax}$ and $Z = Z_K = 150$ m (Z_K is the radiolink altitude over the sea level), we shall receive $g_{WrK} = 6.4$ m/sec·m.

4. Instrumentation

The measurement method essence, adopted in this work, is described above. Let's notice the following. The expression (1) introduces a processing algorithm of the received signal I. It was shown in the work [27], that at such processing of the sources instability of the carrier and modulating frequencies do not enter in (1) and do not influence on the value $\Delta\varphi$ measurement accuracy. It has enabled to facilitate the creation and exploitation problem of the devices, intended for phase characteristics of radiolinks measurement, essentially. The self-excited generators with parametric stabilization of their frequencies are applied at the way implementation as emission sources. The way realised in radiowaves lengths range 8mm and earlier was probed in [1–4]. The final radiolink points were equipped with identical complete transceiver sets as well as the recording equipment. The transmission and sounding signals reception in each of the points were conducted with the same aerial. The aerials of both points are identical and have mirrors of diameters 1,1m. The generators of carrier frequencies had the values frequencies about 37 GHz, and generators of modulating oscillations 0.5 GHz. The generators frequencies of carrier oscillations differed from each other in 50 MHz for radiated and received signals separation. The carrier frequency is $f_{0A} = 36.95$ GHz in the point A, and the carrier frequency is $f_{0B} = 37$ GHz in the point B. The resulting power of each transmission devices executed on Gunn's diodes, is about 70 mW. The generators of carrier and modulating oscillations with concomitant clusters are located in thermostats. The hardware complex contained the systems of the frequencies automatic tuning. The hardware has passed the comprehensive lab tests on a board and into the measuring complex structure within the environment temperatures -25^{0}C ... +35^{0}C in different meteorological conditions. One-channel recorders were used for registration in both final points. The additional recorder was used in the point A and for amplitude registration of a received signal. This information allowed to distinguish the time periods, during which the hydrometeors (rain, snow) settled out, that was not always possible to determine visually. As well the amplitude channel executed the function of the work continuous control of the measuring system. The analysis of the hardware actual characteristics and its test results have shown, that sa is the hardware resulting root-mean-square measurement error of the values Φ does not exceed 2.4^0.

5. The radiointerferometer work

In the accepted measurement method according to (10) the measured value Φ represents the difference of phase invariants values of radiolink probing signals, received simultaneously in radiolink points. Allowing (9), (25), (26), we shall write the expression for Φ as follows

$$\Phi = -\Delta k^2 \Delta r_+^2 \frac{R\left(1-R^2\right)\sin k_{0B}\Delta r_+}{\left(1+R^2-2R\cos k_{0B}\Delta r_+\right)^2} + \\ +\Delta k^2 \Delta r_-^2 \frac{R\left(1-R^2\right)\sin k_{0A}\Delta r_-}{\left(1+R^2-2R\cos k_{0A}\Delta r_-\right)^2}, \qquad (38)$$

where the indexes at k_{0A} and k_{0B} reflect the difference of probing signals carrier frequencies, received in the points A and B accordingly. The first member of the right part (38) represents the value $\Delta\varphi_A$, the second represents the value $\Delta\varphi_B$. The expression (38) is written to conformity with the initial hypothesis position of the ethereal wind northern apex. In this case the values Δr_+, Δr_- are determined by the expressions (25), (26) accordingly and the measured value F should get the positive values. Let's consider the work features of the measurement method, which are stipulated by its specific technical implementation.

We shall consider the isotropic case ($W_{up} = W_l = 0$), that corresponds to radiowaves propagation in Aether, fixed regarding the observer (radiolink) at the presence of isotropic atmosphere within the adopted hypothesis. (It is adequate to such medium as Aether absence in nature within the modern generally accepted imaginations.) In this case the radiowave propagation velocity does not depend on the radiation direction, but depends on the altitude above the Earth's surface $V(Z) = c/n(Z)$. As $W_{up} = W_l = 0$ and $g_{Wr} = 0$, according to (25), (26), (24), we shall receive $\Delta r_+ = \Delta r_- = \Delta r$. Then, if in (38) to suppose, that $k_{0B} = k_{0A}$, we shall receive $\Phi = 0$ and this equalling, according to a reciprocity principle, does not depend on the interspace properties. However, the engineering solution was accepted at this method implementation, in which the carrier frequencies value of probing signals, emitted by each of radiolink points, differed. As $k_{0B} = k_{0A}$, $\Phi \neq 0$, that we shall consider $\Delta\Phi$ as the measurements error. We shall identify the values $\Delta\Phi$ depending on the parameters change such as g_n and R with (38), (24). We shall estimate probable ranges of the values change g_n and R for the calculations fulfilment. The average values g_n change from -4.25$\cdot 10^{-8}$ m^{-1} in winter up to -5.95$\cdot 10^{-8}$ m^{-1} in summer in the air layer 25–50 m above the Earth's surface according to the work data [30–32]. Such data take intermediate values in spring and autumn. The values g_n change on the average during the day as follows (-3,6 ... -4,9)$\cdot 10^{-8}$ m^{-1} in winter and (-5,5 ... -6,4)$\cdot 10^{-8}$ m^{-1} in summer.

According to the work [26], on flat tracts with grass covering, the values change of the reflection coefficient module R is within the limits of 0.2 ... 0.5 on the wave 8 mm, in the season of active vegetation, up to 0.4 ... 0.7 after grass withering, remaining approximately the same if there is a friable snow cover. Thus the highest values of the reflection coefficient, reached 0.7 ... 0.8, were noticed in the season of snow melting.

In the work, at $\Delta\Phi$ errors calculating, the range of the value R change is taken within 0.03 ... 0.07, that is stipulated by the mentioned above features of the reflected wave formation in a radiolink. The selected change range R is matched to its change range as to the value, measured in the work [26], and includes the value $R = 0.,04$, which is determined in the work from the field vertical probing results in an experimental radiolink (left-hand piece of the Fig. 3). Such probing was executed at the end of summer, when the grass covering represented the withering green. It is possible to suppose on the basis of the work results [26] and vertical probing data, that the values $R \approx (0,04 - 0,05)$ are close to average value in a radiolink during the part of the year, since September till January, in which the measurements were executed. We shall use such change range R at fulfilment of the ethereal wind parameters estimations.

The calculation results of $\Delta\Phi$ error values and $\Delta\varphi$ values are presented on two pieces of the Fig. 4 depending on the gradient g_n values for three values R.

Abscissa axis for these pieces is common. The values g_n and the values, conforming to them *Deltar*, are given for visualization on it. The conformity between these values was established with the help (24). The values $\Delta\Phi$ and $\Delta\varphi$ in grades were taken on ordinate axises. On the lower piece, for $R = 0.05$, two curves are given, i.e. $\Delta\varphi_A(g_n)$ is the continuous line and $\Delta\varphi_B(g_n)$ is the broken line. As it is visible, the curves are shifted regarding each other. It was stipulated by the values difference of probing signals carrier frequencies, as the results in errors $\Delta\Phi$ occurrence. The curves $\Delta\varphi_A(g_n)$ and $\Delta\varphi_B(g_n)$ represent the maxima and minima position of interference patterns in the points A and B. (The analogue is the interference pattern in an optical interferometer). The radio interferometer working section, within which the measurements were conducted, is indicated by the heavy straight line section in the bottom part of the piece. The same relations for values $R = 0.03$ and $R = 0.07$ are reflected in the piece by the curves $\Delta\varphi_A(g_n)$, shown only within the radio interferometer working section. The errors $\Delta\Phi$ calculation results, executed for three values R are given on the upper piece of the Fig. 4. The value g_n change range is indicated by the broken line, i.e. the stroke

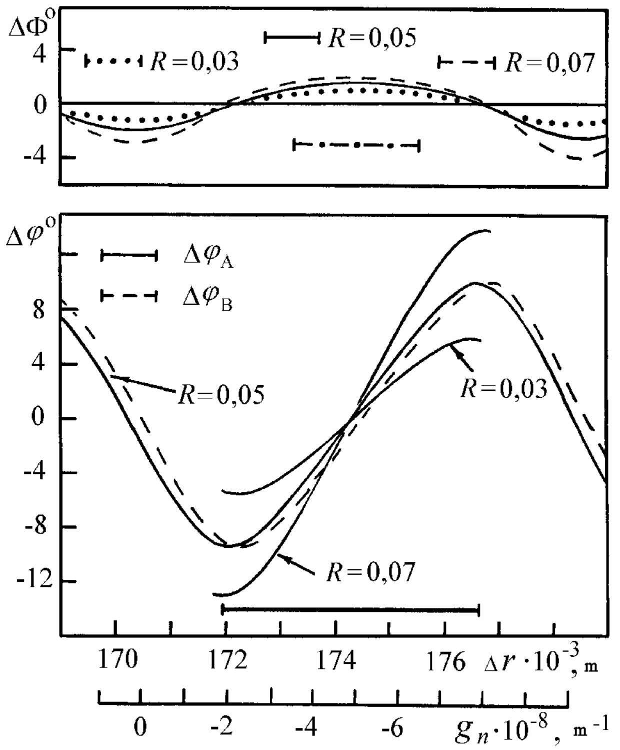

Figure 4: The measurement error relation to the vertical profile gradient of the refraction coefficient

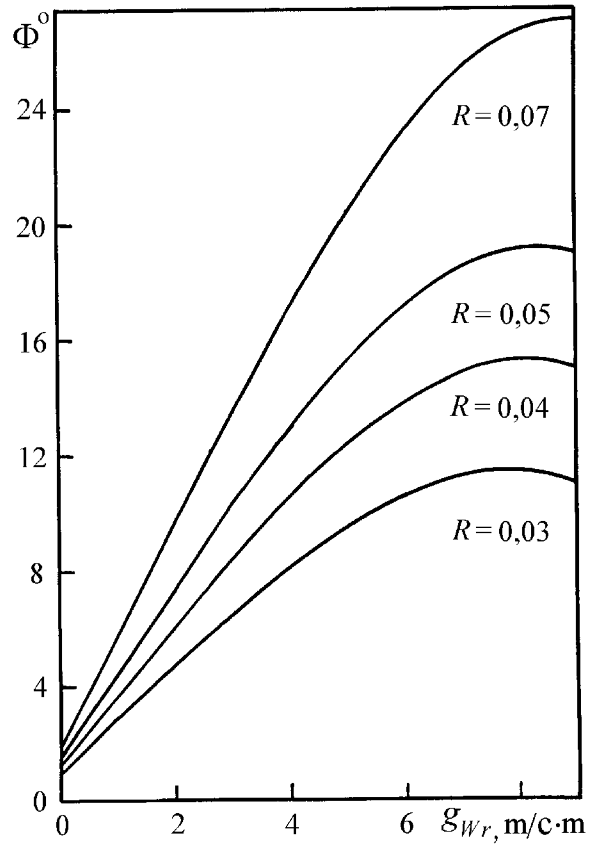

Figure 5: The measured value relation to the ethereal wind velocity gradient

section in this piece bottom, which was determined from the works [30–32]. It follows from the Fig. 4 and calculations results, that the value $\Delta\Phi$ changes in all the indicated gradient g_n change range in the following limits: at $R = 0.04$ from $\Delta\Phi_{min} = 0.870$ up to $\Delta\Phi_{max} = 1.180$; at $R = 0.05$ from $\Delta\Phi_{min} = 1.090$ up to $\Delta\Phi_{max} = 1.430$. The calculations have shown, that the error $\Delta\Phi$ is systematic and can be considered as the correction.

The diurnal and seasonal variations of ambient temperature can result in the radio link geometry change — the value Δr_0 change, and at $f_{0A} \neq f_{0B}$ the errors $\Delta\Phi_T$ occurrence is possible. It can be supposed, that the radiolink length remains invariable, since the radiolink final points are arranged on concrete buildings, the foundations of which are in an ice-free soil layer at almost constant temperature. Nevertheless, the errors calculation DFT was executed in the supposition, that the whole radiolink was located on concrete foundation with the length 13000 m. It has appeared, that the value $\Phi_T \leq 0.01^0$ in the temperature range $galaev.tex\Delta T = 50^0$C. A bit larger errors can occur at altitudes temperature change of radiolink final points. $\Delta\Phi_T \leq 0.05^0$ at $\Delta T = 50^0$C in this case. The calculations are conducted at $R = 0.07$. As it is visible the errors $\Delta\Phi_T$ are small, and they can be neglected. The executed analysis has shown, that the measurement method is tolerant practically in an isotropic case to change the environment parameters. The detected errors $\Delta\Phi$ are insignificant and represent systematic displacement, which we shall consider as the correction.

In an anisotropic case ($W_{up} > W_l > 0$, that corresponds to the positions of the initial hypothesis) from (38), (25), (26) follows, that the measured value Φ depends on a radial component gradient of the ethereal wind speed gWr and the value R. The calculation results of the relations $\Phi(g_{Wr})$, executed at $g_n = -5\cdot 10^{-8}$ m^{-1} are given for four values R in the Fig. 5.

The values Φ are put in grades on an ordinate axis. The curves family, given in the Fig. 5, allows to determine the values g_{Wr} by the value Φ measurement results. As the value g_{Wr} is determined as a profile derivative $W_r(Z)$, so the value Φ is proportional to the ethereal wind W_r speed.

The expressions (38), (25), (26) demonstrate the relevant property of the accepted measurement method, necessary for this research problem solving. The measured value is not equal to zero (the correction value is taken into account) only in the case, when two effects of the ethereal wind, i.e. the anisotropy effect and the altitude effect, take place simultaneously. Really, it is easy to see, that $\Phi \neq 0$ only when $W_{rup} \neq W_{rl} \neq 0$. In other cases, when $W_{rup} = W_{rl}$ (i.e. $g_{Wr} = 0$) or $W_{rup} = W_{rl} = 0$, the measured value $\Phi = 0$. In other words, the method is responsive to the Earth's relative movement and electromagnetic waves propagation medium — the Aether only in the case, if this medium will form a gradiant layer near the Earth's surface at the motion, i.e. if the medium shows the viscosity property — the property intrinsic to material mediums, which are derivated from separate fragments. Therefore, the anisotropic effects and altitudes can be found out with the reviewed measurement method in the unified measurement act. The space effect also can be found in this unified measurement act, as the same measurements results should be subjected to the averaging procedure in the sidereal time scale for periodic components detection.

6. The measurement technique

The probing signals I_A and I_B were emitted towards one another from the points A and B accordingly. Simultaneously the probing signals reception and their processing according to the adopted measurement way were performed in each of the points. The measured values $\Delta\varphi_A$ and $\Delta\varphi_B$ were recorded on the recorders' tapes in both points. The time marks were performed in the point A and were transmitted with the signal I_A to the point B. These marks were recorded synchronically with both points of the recorders in such a way. The measurements were conducted continuously and around-the-clock. The instrumentation calibration and control of its operation implemented with the self-contained device, which performed the testing signal with controled parameters and the spectrum similar to the probing signal spectrum. Such operations were conducted at regular intervals, as a rule, 1 time for 1 operating hour.

7. The processing technique of measurement results

The measurement results processing of the values $\Delta\varphi_A$ and $\Delta\varphi_B$ included the calculation procedures of the measured value Φ; its diurnal variation within separate sidereal day $\Phi_d(S)$; its diurnal variation within sidereal day, averaged for the whole measurements cycle of $\overline{\Phi}(S)$; root-mean-square deviations σ_Φ.

The values $\Delta\varphi_A$ and $\Delta\varphi_B$ were shown on separate chart tapes like continuous records. The signal amplitude record was used for the sites allocation, executed at hydrometeors falling. Such sites were removed from further processing. The sidereal time marks were synchro recorded on all tapes. The values $\Delta\varphi_A(S)$ and $\Delta\varphi_B(S)$ readouts were made, they were recorded in the table of the conforming observations date from these tapes with the separate slide scale, in one hour of the sidereal time. In the same table, the values of the measured value $\Phi(S)$ were recorded, calculated on the formula (10) for each of this sidereal day hours. The sequence of such numbers obtained for separate sidereal day, describes diurnal variation $\Phi_d(S)$. The calculated values were recorded in the other table. The average value of the measured one was calculated for each hour of this table sidereal day

$$\overline{\Phi(S)} = \frac{1}{\rho}\sum_{j=1}^{\rho}\Phi_j(S), \tag{39}$$

where ρ is the quantity of the value Φ readouts, made during the whole cycle of measurements, in the sidereal time equal to S. The root-mean-square deviations of values Φ from its average value were calculated for each hour of the sidereal time with the following known expression [34]:

$$\sigma_\Phi(S) = \left\{\frac{1}{\rho}\sum_{j=1}^{\rho}\left[\Phi_j(S) - \overline{\Phi(S)}\right]^2\right\}^{1/2}. \tag{40}$$

Table 1: Distribution of measurement time on months of the year

Month of the year	IX	X	XI	XII	I
Common measurement time (hours)	278	193	165	300	352

8. Measurement results

The results are considered in the work, which were obtained during 5 months, since September 1998 till January 1999. The measurements were conducted around-the-clock, except both weekends and holidays as well as the cases, when the electric power was not supplied to one of the measuring points for technical reasons. The general time of continuous measurements was 1288 hours. The measurement time distribution on months of the year is shown in the Tab. 1.

The distribution of readouts quantity of the measured value $\Delta\Phi$ on sidereal day time, for the whole measurement cycle (5 months), is shown in the Tab. 2.

In the Fig. 6 the examples of measurement result records, 9^{th} November 1998 are shown.

The figure is composed from pieces mated in time of three chart tapes with the following values records: signal amplitudes, adopted in the point A (the upper curve); the phase invariant $\Delta\varphi_A$, the phase invariant

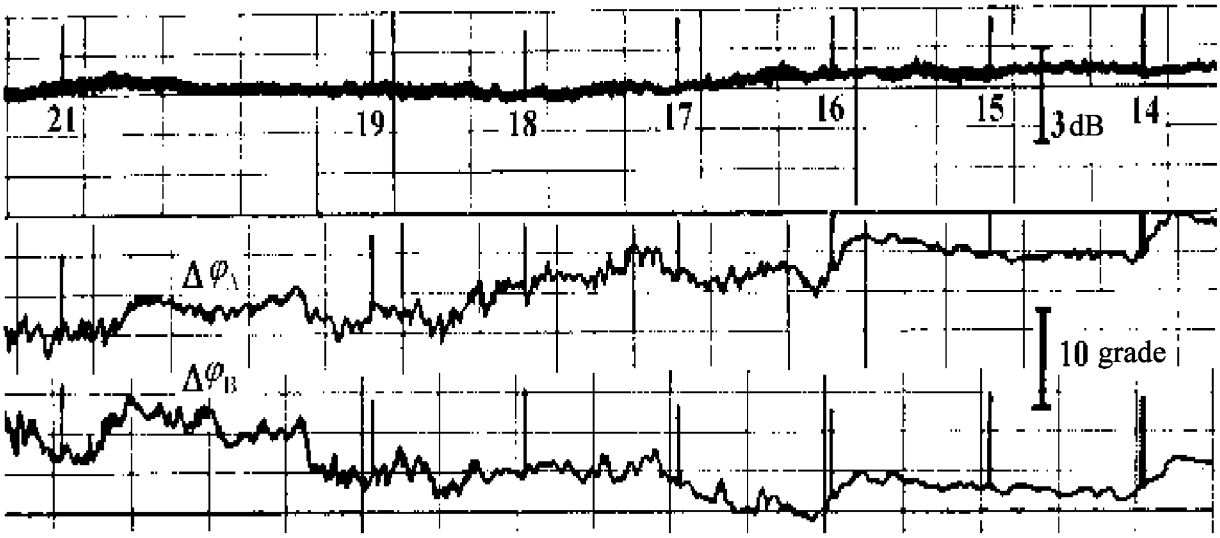

Figure 6: The example of registered values records

Table 2: Distribution of readouts quantity of the measured value on the sidereal day time

Sidereal time (hour)	1	2	3	4	5	6	7	8	9	10	11	12
Quantity of readouts	53	54	55	54	54	50	50	52	51	52	53	53
	13	14	15	16	17	18	19	20	21	22	23	24
	51	52	54	55	57	54	54	57	55	55	55	58

$\Delta\varphi_B$ (lower curve). The pieces illustrate the typical changes of the registered values. Speeds of the chart tapes drive are 20 mm/hour. The vertical strokes represent time marks in the figure. The digits under strokes indicate the sidereal time value in hours. The time flow direction is from right to left. The scale sections for a signal amplitude change estimation in decibels and phase invariant values change in degrees are marked in the figure right section. The change of time difference between the values $\Delta\varphi_A$ and $\Delta\varphi_B$, i.e. the change of the measured value $\Phi = \Delta\varphi_A - \Delta\varphi_B$ can be seen in the figure. From the moment $S = 14$ hour up to $S = 21$ hour, the value Φ has changed to $\approx 11^0$. The difference between values $\Delta\varphi_A$ and $\Delta\varphi_B$ fluctuations can be explained by the following. The radiowaves are propagated in counter directions in a radio link. According to the initial hypothesis, their propagation medium is the Aether — material medium, having the properties of viscous and compressible gas. The gradiant speed layer is formed in the Aether flow at Aether motion near the rough surface, as well as at motion of any viscous and compressible gas, and such motion can be accompanied by this flow parameters fluctuations. (Other causes of such fluctuations are possible also).

The ethereal wind speed fluctuations and this speed gradient g_W result in values fluctuations $\Delta\varphi_A$ and $\Delta\varphi_B$. It follows from (25), (26) and lower pieces of the Fig. 4, that such fluctuations are counter correlated. The radiowaves propagation in the Aether occurs in isotropic atmosphere available at the same time. Known atmosphere parameters fluctuations [29] also will result in fluctuations $\Delta\varphi_A$ and $\Delta\varphi_B$. It follows from (23) and lower piece of the Fig. 4, that the fluctuations g_n result in the correlated fluctuations of values $\Delta\varphi_A$ and $\Delta\varphi_B$. Therefore, the fluctuations of each values $\Delta\varphi_A$ and $\Delta\varphi_B$ within the adopted fluctuation hypothesis are the fluctuation superposition, stipulated by the indicated causes. Besides, it follows from (16), (17), that $g_{n+} \neq g_{n-}$ is at $g_{Wr} \neq 0$. In this case the radiowaves refraction, distributing in the driving Aether in counter directions, is various. The radiowaves pathways pass with the distinguished characteristics in the

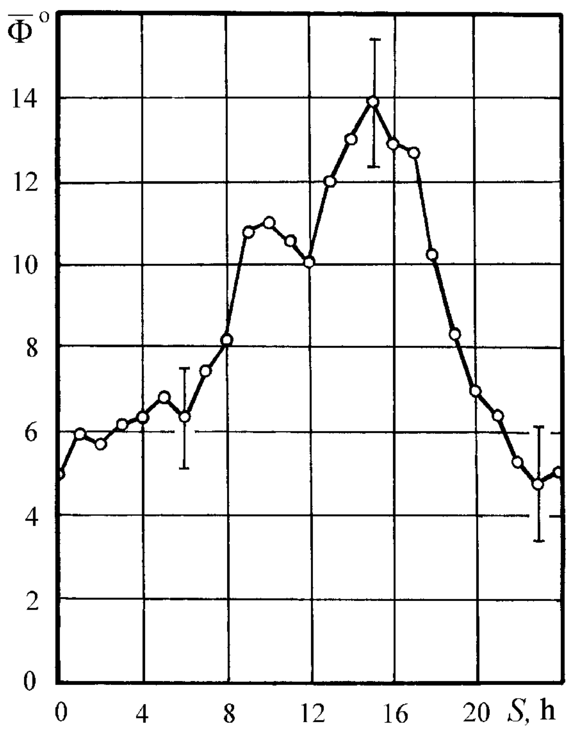

Figure 7: Mean diurnal variation of the measured value

space field, and the reflecting sites on the Earth's surface are shifted regarding each other. It can result in the values $\Delta\varphi_A$ and $\Delta\varphi_B$ fluctuation decorrelations. The reviewed features of the values $\Delta\varphi_A$ and $\Delta\varphi_B$ fluctuations formation illustrate the distinctions available, which are visible in the Fig. 6.

The systematic measurement results were subjected to statistical processing. The mean diurnal variation of the measured value within sidereal day $\overline{\Phi}\,(S)$ is given in the Fig. 7

The sidereal time S in hours is marked on an abscissa axis, the measured value in grades is marked on an ordinate axis. The vertical strokes indicate confidence intervals, defined as $\overline{\Phi}\,(S) \pm \sigma_\Phi\,(S)$. It follows from a Fig. 7, that the measurement results are not definitely zero and are not accidental observation errors. The relation $\overline{\Phi}\,(S)$ has the expressed form of the varied value with the period, equal to one sidereal day, i.e. the measured effect has a space parentage. It is shown above, that the measured value is not equal to zero point only in the case when two effects of the ethereal wind, i.e. an anisotropies effect, stipulated by the Earth's relative movement and radiowaves propagation medium as well as the altitude effect, stipulated by the speed gradiant layer in this medium flow available, take place simultaneously. The positive measurement results, given in the Fig. 7, demonstrate, that these both required ethereal wind effects take place simultaneously. Therefore, the space effect development, the anisotropy effect and the altitude effect are shown in the unified experiment, in the unified measurement act.

Let's compare the measurement results of the work to the results [5] and [11]. We shall use maximum ratings of the measured values at matching. We'll define the values g_{WrK} with the relations $\Phi(g_{Wr})$, which were given in the Fig. 5. We shall call such values g_{WrK} to be measured. The measured gradient values of the ethereal wind speed horizontal component g_{WK} can be found as follows

$$g_{WK} = g_{WrK} / \cos\alpha, \qquad (41)$$

that follows from the expressions (35) - (37) results. The expression (37) allows to compare the measurement results of the work to the data [5, 11]. Really, having put in (37) $Z = Z_K$ can be found, that

$$W_M = \frac{g_{WrK}\, e^{\beta Z_K} \sin(\delta_M + \varphi_M)}{b\beta \cos\alpha \sin(\delta_M + \varphi_K)}. \qquad (42)$$

The expression (42) allows to calculate the values W_M with the measured values g_{WrK}. We shall designate the values WM, calculated with (42), as W_{MK} and treat this value as follows: W_{MK} is the horizontal component of ethereal wind speed on the geographic latitude φ_M, the altitude Z_M, calculated by the measurements results of the ethereal wind velocity gradient at the latitude φ_M and the altitude Z_K.

Let's substitute the value W_M, defined by (42), in (36). Let's receive, that the radial component of the ethereal wind speed in a radiolink can be determined with the following expression

$$W_{rK} = g_{WrK}\left(e^{\beta Z_K} - 1\right)/\beta. \qquad (43)$$

This speed horizontal component is equal accordingly to

$$W_K = W_{rK} / \cos\alpha. \qquad (44)$$

Calculated with (43), (44) we shall call also the values W_{rK} and W_K to be measured.

The parameters measurement results of the ethereal wind and the work results [5, 11] are listed in Tab. 3.

The first column of the Tab. 3 represents the value measurements result $\overline{\Phi}\,(S)_{max}$ in grades. The columns 2,3,4 are the calculation results of the ethereal wind parameters executed with the expressions (41), (44), (42) accordingly. The data about the ethereal wind parameters are shown in the table like fractions. Multipair numerator corresponds to the parameter value obtained at $R = 0.04$, and denominator - at $R = 0.05$. Such form of the measurement results representation is stipulated by those, that the systematic values R measurement was not conducted during the experiments. The digit in the column 2, given in brackets, represents the calculated value gWK with (37), (41), that we shall

Table 3: The ethereal wind parameters

1	2	3	4	5	6
$\overline{\Phi}$, grade	$g_{WK}, m/s{\cdot}$m	W_K, m/s	W_{MK}, m/s	W_M, m/s [5]	W_M, m/s [11]
14	$\frac{8,63}{6,22}$; (9,05)	$\frac{1414}{1019}$	$\frac{8490}{6124}$	9000	6000

call as the anticipated ethereal wind velocity gradient value in Kharkov. The column 5 represents the maximal ethereal wind speed value, obtained by Miller at measurement results averaging, executed in the observatory Mount Wilson in April, August and September 1925 [5]. The column 6 represents the maximal ethereal wind speed value, measured in the observatory Mount Wilson in the experiment [11], 1929.

The executed estimations have shown, that the horizontal component of ethereal wind speed reaches the value $W_K \approx 1414$ m/s in Kharkov. This work measurement results are recalculated to the observatory Mount Wilson location with the expression (42). The obtained value $W_{MK} \approx 8490$ m/s, that is close to the result [5] $W_M = 9000$ m/s. A bit smaller values W_{MK} (allowing the estimations at $R = 0.05$), in comparison with the result [5], can be explained with different conditions of the experience realization. The cross-country terrains measurement are conducted on the slightly cross terrain. The ambient relief altitudes difference is about 20 m. The experiment [5] was executed at a mountain top and the ambient terrain was much below the measurement conducting place. It can be supposed, that in the first case the terrain ambient relief affect on the ethereal wind speed value is more, than in the case of the work [5]. Such supposition about the surface and local subjects influence (hills, buildings, located closely to the radiolink, etc.) has been confirmed at the results comparison [5] and [11]. So, the ethereal wind speed smaller values in [11] in comparison with the data [5] are explained in [7] by Aether flow deceleration with buildings walls, in which there was this work author's interferometer [11]. Miller [5] built a light wooden house for the measurements realization in the observatory Mount Wilson. There were continuous windows made of white canvas on all its sides. In 1929 Michelson, Peas, Pearson [11] conducted the similar experiment in a fundamental building of an optical workshop in Mount Wilson observatory. The ethereal wind measured speed was no more than 6000 m/s as a result.

The ethereal wind speed value, measured in a radio frequency band at the work, is close to the ethereal wind speeds values, measured in electromagnetic waves optical range in the experiments of Miller [5, 6], Michelson, Peas, Pearson [11]. Such comparison results can be considered as mutual confirmation of the research results veracity, the experiment [5, 6] and the experiment [11].

The ethereal wind velocity gradient measurements were not performed in former works, we can compare the measured values g_{WK} with the anticipated (calculated) value. As we can see from the table 3 (column 2) the value g_{WK} measurement results are close to its calculated value.

The executed analysis has shown, that this work results can be explained by radiowaves propagation phenomenon in a space parentage driving medium with a gradiant layer speed in this medium flow near the Earth's surface. The gradiant layer available testifies that this medium has the viscosity — the property intrinsic material media, i.e. media consisting of separate particles. Thus, the executed experiment results agree with the initial hypothesis positions about the Aether material medium existence in the nature.

9. Conclusion

The parameters measurement method of anisotropic media of electromagnetic waves propagation was offered and realised in the range of millimeter radiowaves at the work. The systematic experimental research results, executed near the Earth's radiolink of a line-of-sight, have shown:

— the Earth's relative movement and radiowaves propagation medium available;

— the radiowaves propagation medium flow has a space origin;

— the radiowaves propagation medium has the viscosity — the property intrinsic to material media consisting of separate particles.

The work results can be considered as the experimental hypothesis confirmation about the existence of such material medium, as the Aether, in the nature.

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