The Palindrome Effect

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As initially experimental material of this paper serves sets of histograms built on the base of short samples which provided the daily time series of the α-decay rate fluctuations and the p-n junction current fluctuations. Investigations of the histograms similarity revealed the palindrome effect, which is: two sets of histograms built on the base of two consecutive 12-hours time series are most similar if one set of the histograms is rearranged in inverse order, and the start time of the series is exact six hours later the local noon.

1 Introduction

As was shown in our previous works, the similarity of histograms built on the base of short samples of the time series of fluctuations measured on the processes of different nature, changes the regularly with time. These changes can be characterized by different periods equal the solar (1440 min) and sidereal (1436 min) days, several near 27-day periods, and yearly periods [1–5]. At different geographical locations the shapes of the histograms are similar to each other with high probability for the coincident moments of the local time [6]. Also it was found the dependence of the histogram patterns on the spatial directions of outgoing α-particles [5] and the motion specific to the measurement system [7]. Aforementioned phenomena led us to an idea that the histogram patterns can be dependent on also the sign of the projection obtained from the velocity vector of the measurement system projected onto the Earth's orbital velocity vector. As was found, this supposition is true.

2 The method

A raw experimental data we used for this paper were sets of the histograms built on the base of short samples which provided the daily time series of ^{239}Pu α-decay rate fluctuations and the p-n junction current fluctuations. The experimental data processing and histogram sets analyzing are given in details in [1, 2].

We use the daily time series of fluctuations in the study. Every time series started six hours later the local noon. After the data acquisition, we divided the 24-hours record into two 12-hours ones. On the base of these two consecutive 12-hours time series two sets of histograms (so-called "direct sets") were obtained for further analysis. The sign of the measurement system's velocity projected onto the Earth's orbital velocity is positive for one set, while the sign is negative for the other. Proceeding from the direct sets, by rearranging in inverse order, we obtained two "inverse" sets of histograms.

The histograms themselves were built on the base of the 60 of 1-sec measurements. So, one histogram durations was 1 min, while the 12-hours time series we used in the present work formed the sets consisting of 720 such histograms. The similarity of the histogram was studied for couplets ("direct-direct" and "direct-inverse") along the 720-histogram sets. Here we present the results in the form of interval distribution: the number of similar pairs of the histograms is present as a function on the time interval between them.

3 Experimental results

Fig. 1 shows the interval distributions for two couplets of the sets built on the base of the daily time series of ^{239}Pu α-decay rate fluctuations, obtained on April 23, 2004. The left diagram, Fig. 1a, shows the interval distribution for the "direct-inverse" histogram sets. From the right side of the diagram, we get the "direct-direct" histogram sets.

A peak shown in Fig. 1a means that the histograms with the coincident numbers in the "direct-inverse" sets are similar with very high probability. These sets of similar histograms constitute about 20% from the total number (720) of the pairs. In contrast to the "direct-inverse" sets, the interval distributions in the "direct-direct" histogram sets (Fig. 1b) achieve only 5% of the total number of the pairs for the same zero interval.

We call the *palindrome effect** such a phenomenon, where two sets of the histograms built on the base of two consecutive 12-hours time series are most similar in the case where one of the sets is rearranged in inverse order, while the daily record starts six hours later the local noon.

The palindrome effect doesn't depend from the annual motion of the Earth. This effect is actually the same for all the seasons. This statement is illustrated by Fig. 2, where the palindrome effect is displayed for the measurements carried out on the autumnal equinox, September 22–23, 2005.

*This comes from the Greek word $\pi\alpha\lambda\grave{\iota}\nu\delta\rho o\mu o\varsigma$, which means *there and back*.

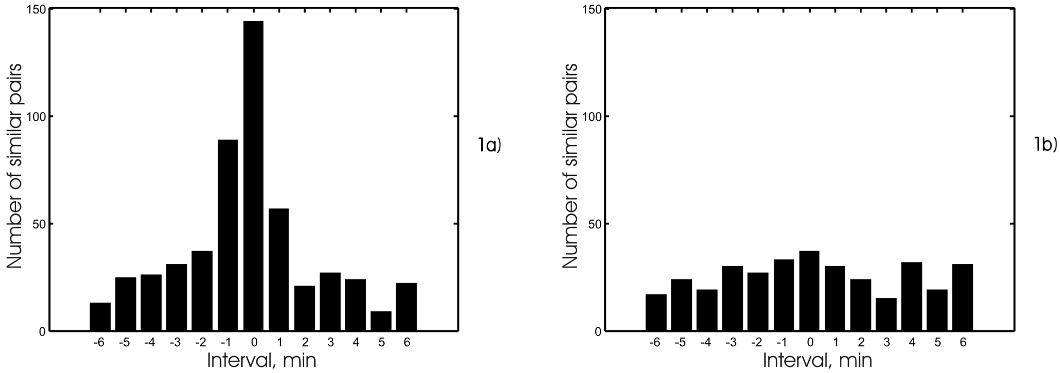

Fig. 1: The palindrome effect in the daily time series of the ^{239}Pu α-decay rate fluctuations, registered on April 23, 2004. The interval distribution for the "direct-inverse" histogram sets are shown in Fig. 1a, while those for the "direct-direct" histograms sets are shown in Fig. 1b.

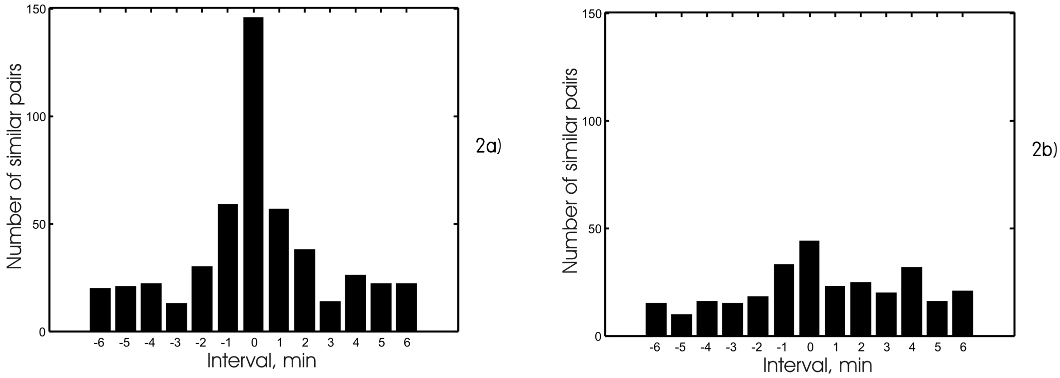

Fig. 2: The palindrome effect in the daily time series of the ^{239}Pu α-decay rate fluctuations, registered on the autumnal equinox, September 22-23, 2005. The interval distribution for the "direct-inverse" histogram sets are shown in Fig. 1a, while those for the "direct-direct" histogram sets are shown in Fig. 2b.

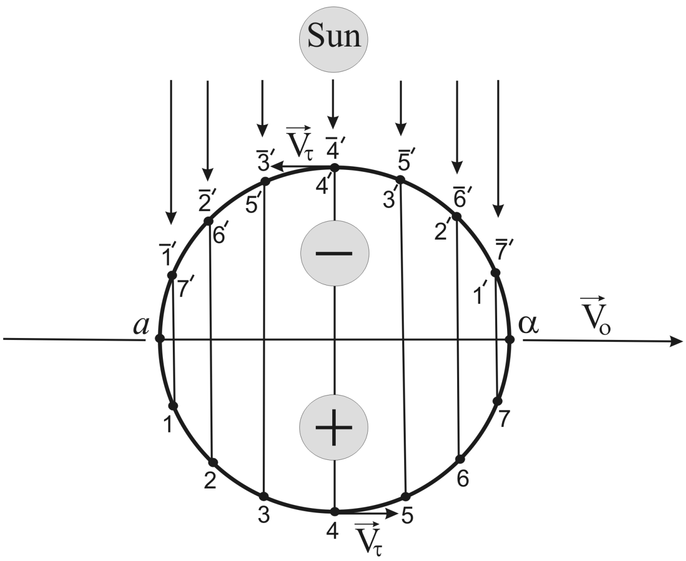

Fig. 3: The palindrome effect.

As easy to see, Fig. 2a and Fig. 2b are similar to Fig. 1a and Fig. 1b respectively. Similarly to Fig. 1 and Fig. 2, the interval distribution was obtained also for the winter and summer solstice.

The aforementioned results mean that, for different locations of the Earth in its circumsolar orbit, we have the same appearance of the palindrome effect.

4 Discussions

It is important to note that the 12-hours time series used in the present work were measured in such a way that the projection of the tangential velocity vector V_τ (Fig. 3) of the measurement system (which is due to the rotatory motion of the Earth) onto the vector of the orbital velocity of the Earth V_o has the same sign. So, two moments of time or, in another word, two singular points a and α exist in the 24-hours daily circle where the sign of the projection changes. The sign of the projection is showed in Fig. 3 by gray circles. The palindrome effect can be observed, if the 12-hours time series start exact at the moments a and α. For the aforementioned results, these moments are determined within a 1-min accuracy by zero peaks shown in Fig. 1–2.

A special investigation on the time series measured within the 20-min neighborhood of the a and α moments was carry out with use of a semiconductor source of fluctuations (fluctuations of p-n junction current). The interval distribution obtained on the base of two sets of the 2-sec histograms constructed from this time series showed these moments to within the 2-sec accuracy. If we get a symmetric shift of the start-point of the time series relative to the a and α points, we find that the peak on the interval distribution (like those shown in Fig. 1–2) has the same time shift relative to zero interval.

The importance of two singular points a and α for the palindrome effect leads us to an idea about the significance of the tangential velocity vector V_τ and its projection onto the vector V_o. If consider the numerical value of the projection, we see that the set $1'$–$7'$ is symmetric to the $\bar{7}$–$\bar{1}$. In such a case the interval distributions (a) and (b) in Fig. 1–2 should be the same. Because they are different in real, just given supposition is incorrect. We also can consider our measurement system as oriented. In this case the 1 and $1'$ histograms should be the same. This means that zero peaks should be located in the "direct-direct" interval distributions, and be absent on the "direct-inverse" one. As seen in Fig. 1–2, this is not true.

On the other hand, it is possible to formulate a supposition which is qualitatively agreed with the obtained experimental results. This supposition is as follows. There is an external influence unshielded by the Earth, and this influence is orthogonal to V_o. In such a case the inversion of one set of the histograms is understood, and leads to the interval distributions like those of Fig. 1-2. As easy to see, in such an inversion rearrange order of the histograms, the histograms whose location is the same orthogonal line have the same numbers. This is because we have zero-peak in the "direct-inverse" interval distribution.

The origin of such lines can be the Sun. The only problem in this case is the orbital motion of the Earth. We cannot be located in the same line after 24-hours. As probable, we should suppose that this structure of the lines, which are orthogonal to V_o, moves together with the Earth.

Now we continue this bulky research on the palindrome effect. Detailed description of new results and the verifications to the aforementioned suppositions will be subjected in forthcoming publications.

Acknowledgements

The authors are grateful to I. A. Rubinshtein for technical support, and to M. N. Kondrashova, M. S. Panchelyuga, V. A. Kolombet, T. A. Zenchenko, K. I. Zenchenko, D. P. Kharakoz and V. P. Topaly for valuable discussions.

Submitted on February 11, 2008
Accepted on March 10, 2008

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