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INFORMATION

The Process of the Aging of Articles on Acoustics. The View from *Akusticheskii Zhurnal*

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Abstract—By analyzing references, one can obtain interesting information about the kind of research that is being performed, what approaches exist, information about scientists working in a field of interest, the institutions where such research is being carried out, and journals that reflect this information. Citation issues are discussed in the *Akusticheskii Zhurnal* articles. An analysis of the cited literature showed that with the advent of the Internet, the depth of citation increased, as did the reduced half-life of articles. Attention is drawn to references to *Akusticheskii Zhurnal* (hereafter – Acoustics or AJ) itself. An analogy is drawn with the statement of academician V.L. Ginzburg that our scientists do not receive the Nobel Prize "primarily due to their colleagues: Soviet physicists," who, as it turns out, do not really nominate their compatriots. The same can be attributed to the inadequate impact factor of *Acoustics*, which is decreased by the authors themselves. The issues of information support in the field of Russian-speaking acoustics are discussed.

Keywords: acoustic information support, the *Akusticheskii Zhurnal*, references, article lifetime
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INTRODUCTION

Each faithfully performed new study begins with a study of the work of its predecessors. These works are subsequently included in the list of references. The breadth and depth of the search depends on how deeply we immerse ourselves in the history of the problem we are interested in, on our thoroughness or, rather, meticulousness. Previously, such a search was limited to print publications stored in a scientific library, whose funds we used. With the advent of the Internet and information retrieval systems, searching is not limited by any issue and depends only on our desire, scientific integrity, and responsibility. All of this translates into the list of references. By analyzing these references, one can obtain interesting information about scientists who work in this field, institutions where such studies are carried out, and journals that reflect the necessary information. One can obtain such specific but important information such as the lifetime of an article. The aging process of articles, on the one hand, can be considered both as the loss of their usefulness for consumers, and, on the other hand, as a lack of interest in seriously searching, i.e., scientific integrity. There are also other issues, for example, the struggle between scientific schools (one school "hides" the work of another school) or the preferences of the author of the article.

THE DYNAMICS OF CITATION: GENERAL ISSUES

Determining the rate of aging of cited literature is a mixed process. One can calculate, for example, the so-called "half life of a publication." If we define the age of a cited article as the difference between the year of referencing it and the year of its publication, rank the cited work by age, and select exactly half of the "youngest" citations, then the maximum age of the work from this sample will determine the half-life of the publication. However, the practical relevance of studying cited references is not limited to revealing the aging process. It may reflect connections of one thematic area with others; the popularity of publications, and hence the articles published in them; analysis of the time and milestone periods of the development of scientific areas, and preferably a forecast of their development. Forecasting is very important, but the methodology for obtaining one is still at an embryonic level. Quasi-scientific forecasting is actively used only by scientists for their own purposes who are writing about innovations, state priorities, including in the field of science, and a system of indicators for the development of science (see, for example, [1–4]).

The second way to calculate the rate of aging is to determine the so-called "half life" from atomic physics. Let us formulate it this way: we will consider all cited publications as an ensemble of independent par-

ticles. During one half life, the number of "peer" publications is reduced by approximately 2 times. This is applicable in the case of an exponential decrease in the number of cited publications with their age. We will further verify that this is true. In general, the proportion of cited publications depends on age as follows:

$$N(t)/N_0 \approx p(t) = 2^{-t/T_{1/2}},$$

where N_0 is the number of references to publications of "zero" age, $T_{1/2}$ is the half life, i.e., the age of an article at which the number of references to it is $N_0/2$, t is the time, and p is the probability of survival for the cited article.

It should be noted that the increase or decrease in the quantity of cited literature, as well as the rate of aging should not be equated with the growth or decline of new scientific ideas. The number of citations depends on many factors. Among these, the rapid growth in the number of new journals that have appeared at a dime a dozen with the advent of technological innovations in the preparation of both printed and electronic scientific products can be attributed, as well as in connection with requests for reasons that are far from scientific. Last but not least, the increase in the number of citations is stimulated by the accepted assessment of the quality of the work of researchers, that is, by their citation index and the Hirsch index.

It is interesting, but perhaps logical, that an exponential increase in the number of scientific products results only in a linear increase in their scientific value. This follows from an interesting study by a group of authors [5]. They made a comparison of the annual publication of scientific articles indexed in the Web of Sciences (WoS) database between 1900 and 2017 and the growth of ideas covered by these articles. A well-known tendency was noted to an exponential increase in the number of scientific articles with an average period for doubling the number of scientific articles of 15 years. At the same time, a large-scale analysis of the text using phrases extracted from titles and abstracts to measure the cognitive value of scientific literature showed that the conceptual field of science expands linearly with time. Thus, the average number of publications per scientific idea is constantly growing.

The value of citation is difficult to overestimate. Thus, using well-designed references, one can view the history of issues addressed in the publication. Due to these same references to an article one can see how these questions were developed further. The entire chain is obtained: the article in question, its list of cited literature, its citation list in the cited literature, etc.

Another issue is that the search for articles that should be included in the list of cited literature may be incomplete due to a careless approach to this process or the absence of such articles in the information retrieval system used by the author. What are the other reasons that it is necessary to work on a list of cited and citing publications? There are several such reasons. First, to understand which articles (both citing and cited) form the impact factors of journals. As an example, review publications are considered to have a high citation rating. Is this correct? What other publications are well cited? As reported in [6], the Information Science Institute (ISI), whose data our management focuses on, does not disclose these data. Secondly, for Russian journals, the classical impact factor is calculated only according to the Scientific Electronic Library (RSCI), which, in our opinion, is not quite objective; the creation of a state scientometric system is required to objectively evaluate the scientific work of both institutions and individual scientific collectives and their employees [7, 8]. Thirdly, far from all references from worthy journals fall into consideration. There is also the fault of the authors themselves, who are careless about reconciling the publications they cite; as well, there are errors in introducing information into information databases.

The reasons for the latter may be as follows.

(1) Almost all well-known Russian physical journals are translated into English and therefore have two bibliographies. Are they all taken into account, for example, by WoS or RSCI, when determining the citation index of an article?

(2) Often authors of articles make mistakes in preparing lists of cited literature, and editors do not always discover them. See, for example, issue No. 6 of the AJ for 2016. Almost every article has errors in the bibliography. In this case, this is due to the fact that there was a change of the scientific editor and in this situation they did not perform a thorough checking of the list of references. Following this, the situation returned to normal.

(3) Another problem is that references are made in different sources in completely different ways. It is necessary to create a single database of all references. The result of the creation of such a database of cited and citing literature will be their reconciliation and the creation of a publication search system for various parameters. The search result will be not only the desired publication, but also a list of works cited and those citing it. This is another aspect of the development of information retrieval systems.

(4) The availability of journals is important; here, once again, we note the need for the full presence of magazines on the Internet. In this regard, we call for open access to all Russian journals. By the way, many of the departmental journals, as well as university journals, are placed on the Internet. Among them are highly rated journals: *Physics-Uspekhi*, *Acoustics*, journals of the Siberian Branch of the Russian Academy of Sciences, *ZhETF*, and others.

Table 1. Half-life and half life of publications by 10-year intervals (by references to any sources)

Acoustics: year of analysis	Half lives of publications (years)	Half lives of publications (years)
2018	13	12.6
2008	15	14.9
1998	10	10.0
1988	7	7.4
1978	6	6.5
1968	6	6.6

Table 2. Half-life and half lives of publications by 10-year intervals (by references to the AJ)

Acoustics: year of analysis	Half lives of publications (years)	Half lives of publications by references to the AJ (years)
2018	6.5	5.6
2008	6.0	5.6
1998	4.7	4.5
1988	3.6	3.6
1978	4.4	3.8
1968	3.6	5.6

THE DYNAMICS OF CITATION FOR *ACOUSTICS* (REFERENCES TO ALL SOURCES)

To study the citation process in *Acoustics*, as a representative we used several annual issues with a 10-year interval between them: 1968, 1978, 1988, 1998, 2008, and 2018. For all these years, references were plotted on an age scale and then analyzed. The results obtained by references to any sources are given in Table 1 and in Fig. 1. We see that there is a pronounced effect of increasing the depth of citation with the advent of the Internet (in the public domain). The figures for the half-life and the half lives of publications coincide.

DYNAMICS OF CITATION TO *ACOUSTICS* (REFERENCES ONLY TO *ACOUSTICS*)

The results on the half-life and half lives of publications on the references in *Acoustics* to articles from it are also given in Table 2 and in Fig. 2.

We see that in *Acoustics* there are not so many references to the journal itself. Moreover, the overwhelming number of references are given to the *Journal of the Acoustical Society of America*. If someone is asked to guess, on the basis of the list of references, in which journal this article was published from the AJ, most likely this American journal will be named. We give examples: article [9] (AJ, 2018, No. 3) [9], 12 of 18 references are given to J. Acoust. Soc. Am. In the same issue in the article [10], 16 of 39 references are references to the same American journal, etc.

This is not good for *Acoustics*, does not correspond to its level and, in our opinion, only shows that its authors do not care about the reputation of the journal. For AJ issued in 2019, we counted a low number references to the last 2 years, which are important for calculating the impact factor of a journal (IF). The editorial board is also tolerant and does not take sufficient measures to rectify the situation. Something may be changing only in the last couple of months, as it appears to us, is, but so far this is at the level of declarations. At the same time, information activity in providing scientists in the field of acoustics has been growing in recent years: a full archive of *Acoustics* has appeared on the Internet, and Signal Information on *Acoustics* has begun to be issued. This should affect an increase in the IF log, as it was the existence of the journal that served as the starting point for the creation of other information products related to it [11]. New products not only expand the information properties of the journal, but also serve as the best information support for all those working in the field of acoustics. These online products provide new opportunities for other publications on acoustics and not only for reference to the journal, but, as we hope, serve as an author's understanding of their place in the Russian-speaking information field of acoustics. Authors are given the opportunity to broaden the scope of work in their field that should be studied and referenced if one is a conscientious researcher.

The passivity in the references of the authors is apparently caused not only by poor acquaintance with the works of their predecessors, but also, apparently, by reluctance to refer to the work of their colleagues and to thus increase their rating and competitiveness. It is advisable that in order to increase the impact factor of the journal and bring it closer to an adequate

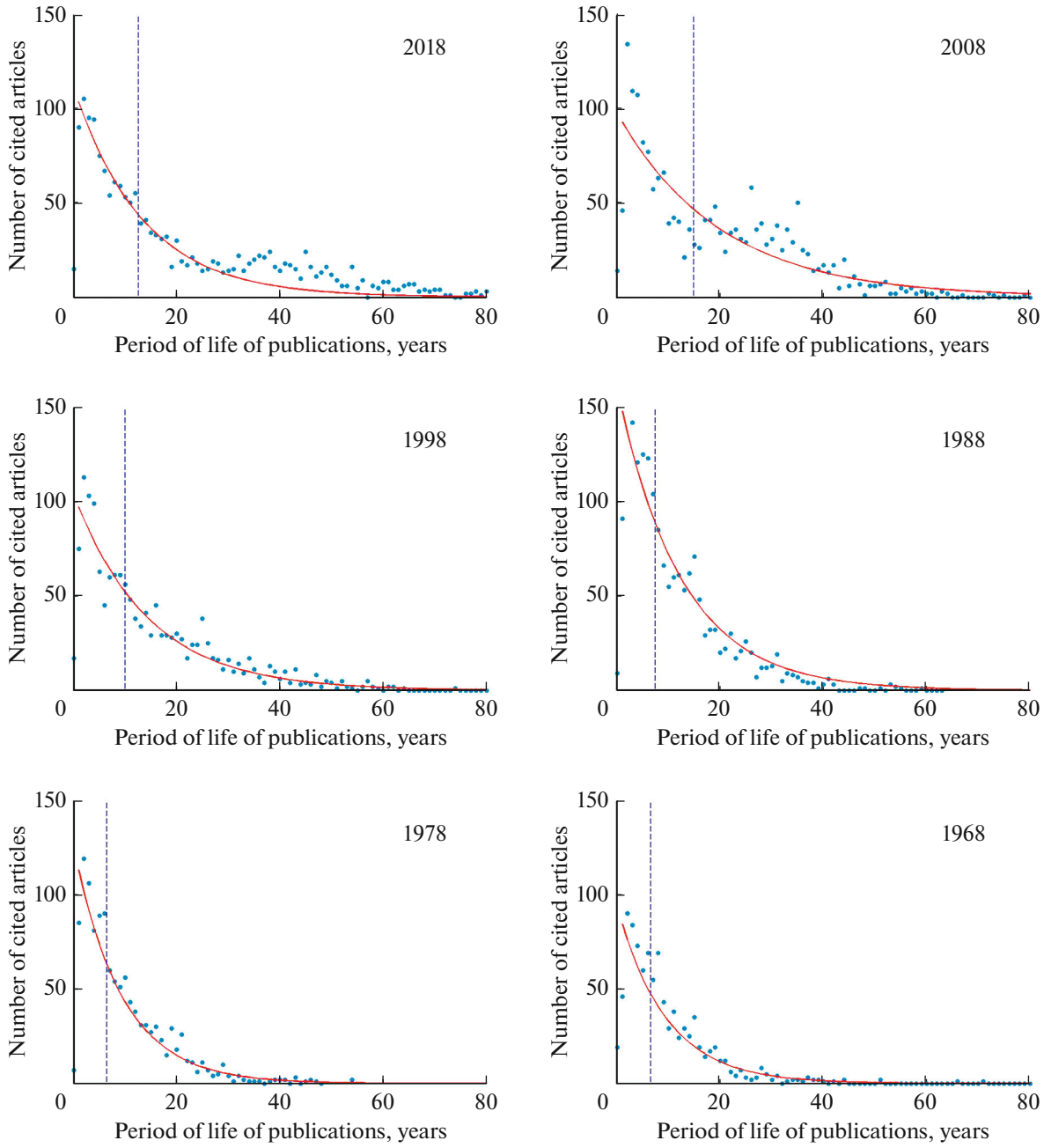

Fig. 1. Charts of the "half lives of publications" in *Acoustics* (references to any sources). The dots show the number of cited articles with a 1-year interval from the publication year of the cited article, the curve shows the exponential decrease of cited publications, the dashed line crosses the timeline at the point of the half life.

level, the authors refer at least to themselves. It is true that references to oneself are not always productive and, in especially "lively" cases, are revealed when determining an author's publication activities.

On the other hand, the quality of *Acoustics* is not in doubt in scientific circles; it is prestigious to have publications in it, which is evident even from the letters of tauthors who are offended by the rejection of their articles.

In this regard, here is a proposal for the Editorial Board. There are articles in the journal, including those in recent years, devoted to general acoustic issues. This is previously published information on new books, which has only recently been revived, and articles on information about Internet products that all authors could refer to, regardless of the topic or their attitude to colleagues. Thus, for example, everyone who uses the Internet archive could give a refer-

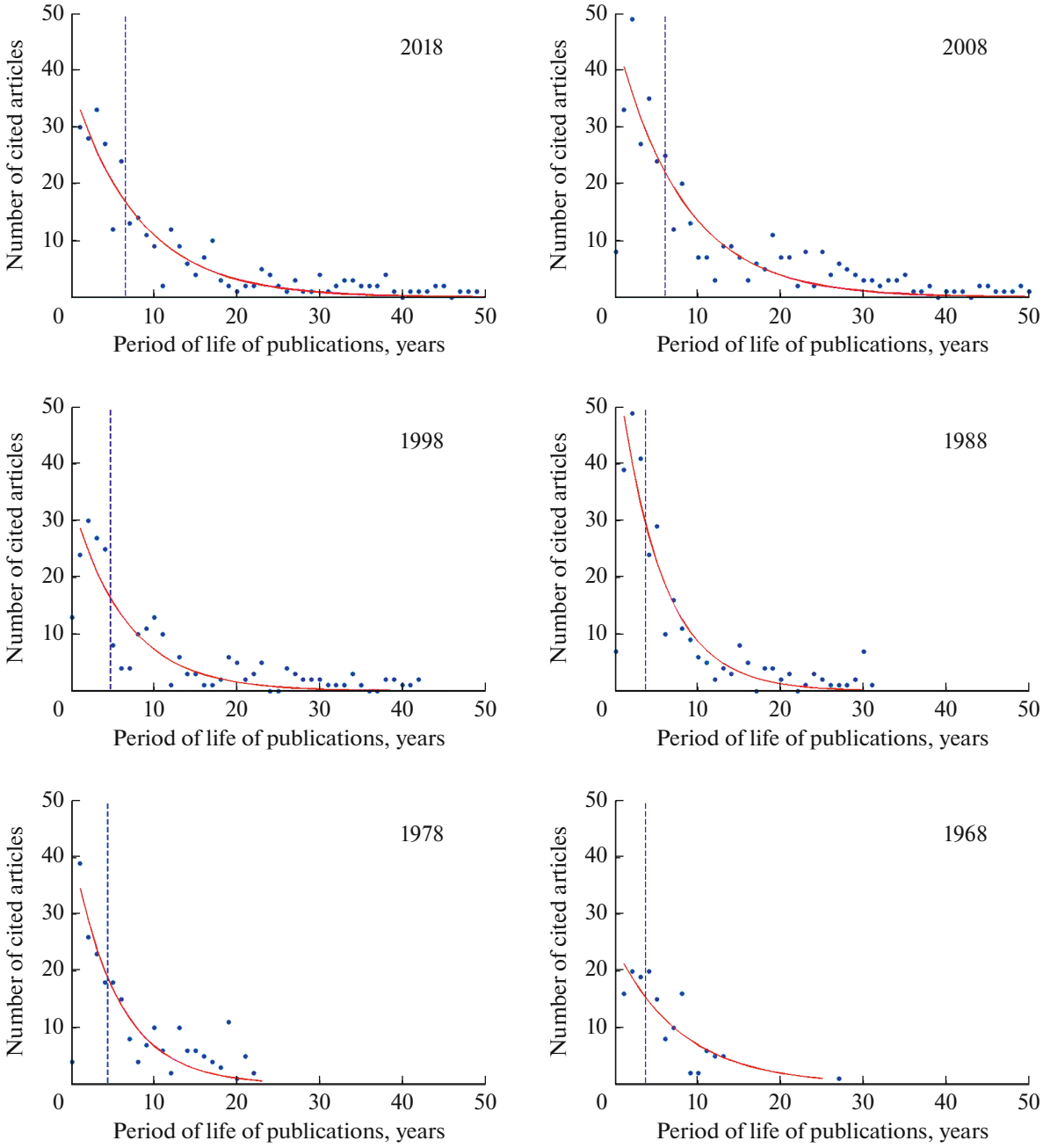

Fig. 2. Charts of the "half lives of publications" in *Acoustics*. Designations are the same as in Fig. 1.

ence to an article in a journal that describes this project, namely an article in a journal, not a site! This also applies to articles on Signal Information. We can see from the statistics of visits to the pages of these sites that acousticians are actively using products; however, they believe that this has fallen from the sky, like manna from heaven, and was not a product of purposeful work. It appears to be "second-grade science" or not science at all. There is no such information support in other areas of physics, and according to Kozma Prutkov "Encouragement is as necessary for a brilliant writer as rosin is necessary for a virtuoso's bow."

By the way, we note that according to the experience of several of our authors who are regularly published in highly rated Western journals, in the absence of references or a small number of references to these journals, the received article is rejected without consideration of its merits.

CONCLUSIONS

As a result of an analysis of bibliographic references, we identified a significant number of errors, typos, incompleteness in the bibliographic information provided, illegal editing of the original article titles, and unification violations in the names of journals. First, this affects the reputation of our journal as a rigorous scientific publication; secondly, due to the loss of information, it leads to a decrease in the citation index of specific authors, while thirdly, it reduces the impact factors of journals due to incorrect references (both to *Acoustics* itself, and other cited publications). In the end, this makes it very difficult to find cited articles for our readers, including when trying to search in information retrieval systems. Why these shortcomings are not noticed by the authors, as well as by the editors; this is apparently due to neglect of this "nonessential" part of the article. When placing an article from *Acoustics* in the list of references, we recommend that one check on the journal's website (http://www.akzh.ru/) [12]; as well it would be a good idea to check other Russian-language sources on the website of the *Acoustics* information system (http://akdata.ru/) [13]. In [8], it was reported that "we provide a scan of the Clarivate Analytics company's page on Acoustic Physics with information on the impact factor of the journal for 2018. If we made 25 references more, then the impact factor would have become more than unity." *Acoustics* has long outgrown its citation index, which is fixed today (0.880). Even according to the RSCI for 2017, it is equal to 1.588. We urge authors and editors of the AJ to take a more careful look at works placed in the list of references.

As for the small number of references by the authors of the AJ to the journal itself, which we have demonstrated in the article, we will give additional reasoning by the Nobel laureate academician V.L. Ginzburg [14]. In his commentary on an article by Yu.I. Solovyov [15], in which the author stated that when choosing the laureates of the prize "everything was decided by political preferences," Vitaly Lazarevich wrote that it is fairer to look for the reason in oneself: "Landsberg and Mandelstam did not share the award with Raman primarily because of the fault of their Soviet physicist colleagues," who, as it turns out, do not really nominate their own compatriots. The above can, it seems to us, be applied to some authors of the AJ, who do not really cite the journal that publishes them. By the way, we note that V.L. Ginzburg published his work in the first issue of *Acoustics*, which had just begun to be published [16], while his last publication was published in our journal in 2005 [17], shortly before his death.

REFERENCES

1. N. G. Kurakova, V. G. Zinov, and L. A. Tsvetkova, Prioritety Nauchno-Tekhnol. Razvit. **3** (3), 154 (2017).
2. E. V. Zhilyakova and S. N. Larin, Vestn. Chuv. Univ., No. 2, 340 (2010).
3. *Determination of Priority Scientific Fields: Interdisciplinary Approach,* Ed. by I. Ya. Kobrinskaya and V. I. Tishchenko (Institute of World Economy and International Relations Russ. Acad. Sci., Moscow, 2016) [in Russian].
4. V. N. Kiselev and E. K. Nechaeva, Innovatsii, No. 7, 45 (2015).
5. S. Fortunato, C. T. Bergstrom, K. Börner, J. A. Evans, D. Helbing, S. Milojević, A. M. Petersen, F. Radicchi, R. Sinatra, B. Uzzi, A. Vespignani, L. Waltman, D. Wang, A.-L. Barabási, Science **359** (6379) (2018). https://doi.org/10.1126/science.aao0185
6. A. B. Zhizhchenko and A. D. Izaak, Usp. Mat. Nauk **64** (4), 195 (2009).
7. R. S. Gilyarevskii and E. V. Mel'nikova, Sci. Tech. Inf. Process. **45** (3), 168 (2018).
8. V. G. Shamaev and A. B. Gorshkov, Akust. Zh. **66** (1), 132 (2020).
9. A. I. Komkin, A. I. Bykov, and M. A. Mironov, Acoust. Phys. **64** (3), 287 (2018).
10. A. A. Lunkov, Acoust. Phys. **64** (3), 347 (2018).
11. V. G. Shamaev, Akust. Zh. **64** (6), 783 (2018).
12. V. G. Shamaev, A. B. Gorshkov, and V. I. Yakimenko, Akust. Zh. **63** (5), 573 (2017).
13. V. G. Shamaev and A. B. Gorshkov, Akust. Zh. **63** (4), 449 (2017).
14. V. L. Ginzburg, Herald Russ. Acad. Sci. **68** (1), 56 (1998).
15. Yu. I. Solov'ev, Herald Russ. Acad. Sci. **67** (4), 295 (1997).
16. V. L. Ginzburg, Akust. Zh. **1** (1), 31 (1955).
17. V. L. Ginzburg, Acoust. Phys. **51** (1), 11 (2005).

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