

The Version of STR Stated in Physics Textbooks is Incorrect, Since it Follows From it That Radio Engineering Should not Exist¹

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ABSTRACT

The article explains that, since the principle of light speed non-exceedance in the version of the special theory of relativity (STR) presented in physics textbooks implies physical unreality of any imaginary numbers, then according to this version of the STR imaginary impedance of capacitors and inductors in radio engineering should also be physically unreal. Thus, resonance should not exist in linear electric circuits and creation of filters should be impossible. Consequently, this should make existence of the whole radio technology impossible. However, since radio engineering exists, the generally accepted version of the STR presented in physics textbooks for study should be recognized as incorrect.

Keywords: Special theory of relativity; Relativistic formulas; Imaginary numbers; Ohm's law; Invisible universes

INTRODUCTION

Nature and the laws of nature are one and consistent. Anytime and anywhere. Be it on Earth, or in distant space, or in the microcosm, or in animate and inanimate nature. However, people, due to their limited intellectual capacity, are able to assimilate only a very small part of this knowledge. That is why even the smartest people know a very small part of general human knowledge in their various fields. Norbert Wiener wrote in this regard: *"Important research is sometimes delayed because results are unknown in one field that have long been classic in a related field."*

That was what happened in physics in the 20th century.

DRAWBACKS AND EXPLANATION OF RELATIVISTIC FORMULAS GIVEN IN PHYSICS TEXTBOOKS

Creation of the special theory of relativity (STR) [1] - [3] is one of the greatest achievements of physics of the 20th century. Relativistic formulas are its main result. However, they gave rise to some questions that hasn't been answered so far. The formulas should actually be explained. Otherwise, no one needs a theory whose formulas cannot be explained even by its authors. But the authors of the STR failed to correctly explain their relativistic formulas. They only created the impression that they did it.

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Let's consider one of these formulas to make it clearer how difficult it was for them to explain these formulas. For example, the Lorentz-Einstein formula

$$m = \frac{m_0}{\sqrt{1 - (v/c)^2}} \quad (1)$$

where m_0 is the rest mass of a moving body (e.g. elementary particle);
 m is the relativistic mass of a moving body;
 v is the velocity of a body;
 c is the speed of light.

It can be seen from the graph of this formula (see Fig. 1) that:

- it has a gap at the value of the argument $v = c$; it corresponds to a physically stable process at $0 \leq v < c$; and it corresponds to a physically unstable process that could not be at $c \leq v$;
- at the same time, at values of the argument $0 \leq v < c$ it corresponds to real numbers, and at $c \leq v$ to imaginary numbers discovered back in the 16th century, but still having no explanation of their physical sense in the 20th century.

Authors of the STR also did not know how to explain imaginary numbers. As well as no one could explain physical sense of imaginary numbers 400 years before them. Admittedly, no one can do it so far. Indeed, everyone knows what 2 kg, 3 m or 5 sec is, but no one knows what $2i$ kg, $3i$ m or $5i$ sec, where $i = \sqrt{-1}$, is.

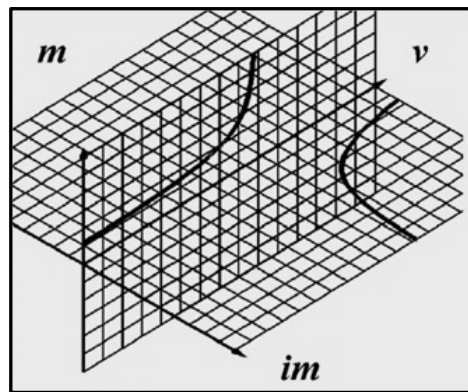


Fig. 1. Graph of function $m(v)$ corresponding to the formula (1)

The future of the STR was jeopardized, but it was saved by introduction of additional postulate called the principle of light speed non-exceedance, the essence of which is clear from its name. The postulate implies that a situation $c \leq v$ that people never and nowhere encounter could be left unexplained as unnecessary. Consequently, imaginary numbers could be considered physically unreal, which is convenient, but unsubstantiated.

And this is the form in which the generally accepted version of the STR is taught in physics textbooks.

WHY IS THE VERSION OF THE STR PRESENTED IN PHYSICS TEXTBOOKS INCORRECT?

But there are other sciences besides physics. They also use imaginary numbers. Radio engineering originated in the 19th century², when even physics was considered natural philosophy, is one of these sciences. Alexander Grigorievich Stoletov wrote about the physics of that time: *"...physics especially tempted natural philosophers. What a favorable theme were electrical phenomena for the most riotous imaginations... Attractive and vague deductions were in the foreground: hard work of experimenter and exact mathematical analysis were not honored; they seemed superfluous and harmful in the study of nature..."*

Existence of radio engineering refutes the STR principle of light speed non-exceedance

In 1826, when there had been no electrical measuring equipment, Georg Simon Ohm discovered a law for DC circuits [4] named after him. But in 1828 Ohm was fired by personal order of the Minister of Education for publishing his physics discoveries. The senior official believed that the use of mathematics in physics was unacceptable.

And in 1897 Charles Proteus Steinmetz proposed his interpretation of Ohm's law in respect to linear AC circuits [5]. Now it is daily used by millions of engineers in their practice. According to this law, not only resistors, but also capacitors and inductors have electrical impedance. What is more, unlike the electrical impedance of resistors R , measured by real numbers, electrical impedance³ of capacitors C ($-j/\omega C$) and inductors L ($j\omega L$) is measured by imaginary numbers. Therefore, electric LCR-circuits of any configuration have impedance that is generally measured by complex numbers. Consequently, its value depends on frequency ω of voltage applied to an electric circuit.

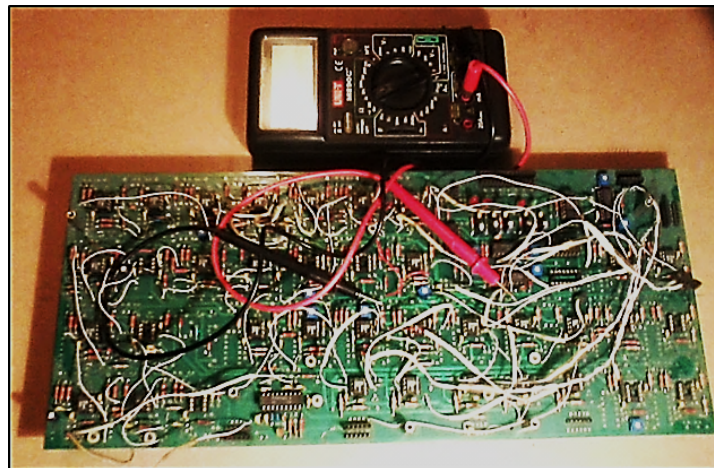


Fig. 2. This is all that is needed instead of the Large Hadron Collider for the experimental proof of physical reality of imaginary numbers

² Although the term 'radio engineering' appeared in the middle of the 20th century

³ In the theory of electric circuits, the imaginary unit $\sqrt{-1}$ is commonly denoted as j instead of i used to denote electric current

This makes it possible to carry out a very simple experiment⁴ that allows us to answer with confidence whether imaginary numbers are physically real [6], [7]. In fact, if imaginary numbers are physically unreal, then their inclusion in electric circuits should not affect measured value of LCR- circuit impedance. In this case, measured impedance of a LCR-circuit should always be measured by real numbers and shouldn't depend on frequency. Conversely, if imaginary numbers are physically real, then value of current flowing through a LCR-circuit changes due to a change in the value of its impedance, when frequency of voltage applied to LCR-circuit changes.

And all radio engineers who have ever held a soldering iron in their hands know that impedance of LCR circuits always depends on frequency of voltage applied to them. Therefore, devices, such as oscilloscopes, frequency response meters, etc., have been created and mass-produced for recording such measurements. Even many radio amateurs have a tester (see Fig. 1), the simplest measuring instrument of this kind, that allows measuring capacitance value. In accordance with Ohm's law in the interpretation of Steinmetz, a tester actually measures imaginary value of electrical impedance (that turns out to exist, since it is measurable) of capacitor and converts it to capacitance value.

And this circumstance, i.e. the ability to measure imaginary value of electrical impedance of a capacitor by instruments, irrefutably proves its physical reality. After all, most of what we know about the world around us, we have learned in all sciences including physics, biology and chemistry, with the help of measuring instruments. And if we trust directly our senses rather than instruments, existence of science would be impossible.

It follows from the STR principle of light speed non-exceedance that existence of radio engineering is impossible

On the other hand, since the fundamental STR principle of light speed non-exceedance implies physical unreality of any imaginary numbers, it also implies physical unreality of imaginary impedance of capacitors $-j/\omega C$ and inductors $j\omega L$ in radio engineering. Therefore, the conclusion that follows from the STR implies:

- impossibility of resonance in electric LCR circuits;
- impossibility of creating any filters using electric LCR circuits; and, as a result,
- impossibility of creating television, radio location, GPS navigation, mobile telephony, medical radio electronics and many other things.

However, all these things actually exist! Now everyone knows about existence of radio engineering. And millions of engineers daily prove physical reality of imaginary electrical impedance of capacitors and inductors in their practice using Ohm's law in the interpretation of Steinmetz. Consequently, this also refers to any other imaginary quantities.

CONCLUSIONS

Thus, radio engineering and the STR turn out to mutually refute each other. That is, only one of these two sciences can be true. But since radio engineering has existed for a long time and been

⁴ For example, in contrast to the OPERA experiment carried out by a collaboration of several hundred physics professors at the Large Hadron Collider for the same purpose

widely used in practice, whereas the STR is based on postulates, there is no doubt that radio engineering is true and the generally accepted version of the STR, which therefore should not contradict radio engineering, is wrong.

It follows from the above that the version of the STR presented in physics textbooks went wrong, when it began to use the principle of light speed non-exceedance that has been refuted in radio engineering by the general scientific principle of physical reality of imaginary numbers. Relativistic formulas of the generally recognized STR, having no explanation at, turned out to be incorrect, because their derivation has not been actually completed.

This conclusion is also confirmed by the fact that there are other refutations of the principle of light speed non-exceedance given in [8] - [11]. An alternative version of the STR containing no identified drawbacks of its generally recognized version is proposed in [12] - [20].

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References

- [1]. Einstein A. 1920. Relativity: The Special and General Theory. H. Holt and Company, NY.
- [2]. Bohm D. 2006. The Special Theory of Relativity. Routledge, Abingdon on Thames.
- [3]. Penrose R. 2010. The Nature of Space and Time. Princeton University Press, Princeton
- [4]. Ohm G. S. 1826. Bestimmung des Gesetzes, nach welchem Metalle die Kontaktelektricität leiten, nebst einem Entwurfe zu einer Theorie des Voltaischen Apparates und des Schweiggerschen Multiplicators. Journal fur Chemie und Physik, 46, 137-166.
- [5]. Steinmetz C. P. 2010. Theory and Calculation of Electric Circuit. Nabu Press., Charlstone, SC.
- [6]. Antonov A. A. 2016 Ohm's law refutes current version of the special theory of relativity. Journal of Modern Physics. 7. 2299-2313 <http://dx.doi.org/10.4236/jmp.2016.716198>
- [7]. Antonov A.A. 2016 Ohm's Law is the general law of exact sciences. PONTE. 72(7) 131-142. doi: 10.21506/j.ponte.2016.7/9
- [8]. Antonov A. A. 2019 The special theory of relativity in the 20-th century was not and not be created. Journal of Russian physical-chemical society. 91(1). 57-94. (in Russian)
- [9]. Antonov A.A. 2020. Albert Einstein was ahead of his time: he did not complete the existing version of the special theory of relativity due to the lack of experimental data obtained only in the 21st century. Journal of Russian physical-chemical society. 92(1). 39-72. (in Russian)
- [10]. Antonov A. A. 2021 The special theory of relativity presented in physics textbooks is wrong. 77 International scientific conference of Eurasian Scientific Association "Theoretical and practical issues of modern science". 11-15. Moscow. ESA. (in Russian) <https://esa-conference.ru/sborniki/?y=2021>
- [11]. Antonov A.A. 2021 Experimental proofs of falsity of the version of the special theory of relativity presented for study in physics textbooks and truth of its alternative version. 80 International scientific conference of Eurasian Scientific Association "Development of science and education in the context of global instability". 8-17. Moscow. ESA. (in Russian) <https://esa-conference.ru/sborniki/?y=2021>
- [12]. Antonov A.A. 2015 Adjustment of the special theory of relativity according to the Ohm's law. American Journal of Electrical and Electronics Engineering. 3(5) 124-129. doi: 10.12691/ajeee-3-5-3
- [13]. Antonov A. A. 2018 Discovery of Dark Space. Journal of Modern Physics. 9. 14-34.

- [14]. Antonov A. A. 2019 Explanation of Dark Matter, Dark Energy and Dark Space: Discovery of Invisible Universes. *Journal of Modern Physics*. 10, 1006-1028.
- [15]. Antonov A. A. 2020. Comparative Analysis of Existing and Alternative Version of the Special Theory of Relativity. *Journal of Modern Physics*. 11(2), 324-342. DOI: 10.4236/jmp.2020.1120
- [16]. Antonov A. A. 2020. Universes Being Invisible on Earth outside the Portals Are Visible in Portals. *Natural Science*. 12(8), 569-587. <http://doi.org/10.4236/ns2020.128044>
- [17]. Antonov A. A. 2020. How to See Invisible Universes. *Journal of Modern Physics*. 11(05), 593-607. <https://doi.org/10.4236/jmp.2020.115039>
- [18]. Antonov A. A. 2020. Einstein was wrong: according to WMAP and Planck spacecraft research we live in a six-dimensional hypercomplex space. *Österreichisches Multiscience Journal*. 35(1). 61-72.
- [19]. <http://osterr-science.com>.
- [20]. Antonov A. A. 2021 How to turn human civilization into super civilization. 72 International scientific conference of Eurasian Scientific Association "Modern concepts of scientific research". 3-15. Moscow. ESA. (in Russian) <https://esa-conference.ru/sborniki/?y=2021>
- [21]. Antonov A. A. 2021 Antimatter, Anti-Space, Anti-Time. *Journal of Modern Physics*, 12, 646-660.
- [22]. <https://doi.org/10.4236/jmp.2021.125042>