Review of: "Comment on "On the linearity of the generalized Lorentz transformation""

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Potential competing interests: No potential competing interests to declare.

SUMMARY OF THE WORK

The aim of this work is twice:

i) To complete (making it easier) Verheest's derivation of the linearity of the one-dimensional Lorentz transformations;

ii) To show that there is no need to postulate "*a priori*" Einstein's light principle. The author replaced the postulate the speed of light in a vacuum is the same for all inertial observers with the principle: "*the speed of propagation of interactions is finite*".

MAIN RESULTS OBTAINED

By combining the *special principle of relativity* with the above postulate **ii)**, the author showed that the interactions must propagate with the same speed in all inertial systems and that speed must be a universal constant.

GENERAL CONSIDERATIONS

- It is customary not to put references or formulas in the "*Abstract*".

- The present work is not "*self-contained*" in the sense that the understanding of this work requires the preliminary reading of the work [1] reported in "*References*" on page 6 of the manuscript.

- Eq. (13) is missing (or, at least, does not appear in the copy of the manuscript at my disposal).

- It must be emphasized that mathematics is very simple and some results are really evident (no explanations needed).

SUGGESTIONS

1) In Eq. (6) and Eq. (7) on page 4 of the manuscript, please define the function "F" and explain its physical meaning.

2) Eq. (11) is a wave equation. So, this partial differential equation admits a unique solution once the boundary conditions are established. Please, clarify this delicate step. Additionally, please explain why you are looking for only the special case of waves where a physical quantity, such as phase, is constant over a plane perpendicular to the wave travel's direction.

3) According to the author, from Eq. (16) we get Eq. (17) and Eq. (18). Even here, further explanations are required. Please, explain why, from the physical point of view, the two integration constants are set to zero (i.e., $m(t)$ and $n(x)$ are set to zero in Eq. (17) and in Eq. (18), respectively).

4) We come now to a fundamental question. If we do not assume that the speed of light is a universal constant, it would have significant implications for the fundamental laws of physics and our understanding of the Universe. For instance,

4i) In special relativity, the constant speed of light is intimately linked to the preservation of causality. If the speed of light were not constant, it could lead to situations where cause and effect become muddled, potentially allowing for time travel or other paradoxical scenarios;

4ii) In special relativity, the energy-momentum relation is given by $E^2 = (pc)^2 + (mc^2)^2$, with E denoting energy, p momentum, m is mass, and c is the speed of light, respectively. This relation assumes that the speed of light is constant. If the speed of light were not constant, this relationship would have to be significantly modified;

4iii) The speed of light is a fundamental constant that appears in many equations in physics, including the famous equation $E=mc^2$. If its value were not constant, we would need to reconsider the numerical values of various physical constants and their implications.

the author is invited to take into account the previous observations, and to elucidate his statement "*We explain that the crucial role that light purportedly plays in Einstein's principles is only apparent and is owed to historical and practical reasons*".

5) The author claimed that "*light was known to be an electromagnetic phenomenon and possessed a finite speed. That historic prospect explains why Einstein gave light such a dominant role, notwithstanding his first principle encompasses all physical laws*". This statement sounds quite obscure to me. Indeed, as known, the constancy of the speed of light is closely related to the symmetry of electromagnetic equations, known as Maxwell's equations. Any change in the speed of light would require rethinking the foundational principles of electromagnetism. The author is invited to clarify the above.

CONCLUSIONS

Written in this form, the manuscript could lead to confusion in the reader's mind. The author is strongly advised to take the above suggestions into account.