Qeios

Peer Review

Review of: "Why Is Gravitational Mass Equal to Inertial Mass?"

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I provide comments in points and subpoints according to the article section. Zero points are the overall assessment.

0.1. The subject matter is interesting and "always relevant", but the approach is too simplistic and one-sided and poorly related to known approaches.

0.2. The article needs fixing - especially the first and last sections.

0.3. The article does not examine alternative operational methods of defining masses. If it only defines one type of mass in one way, then it should claim another mass.

0.4. There are references to Special Relativity, General Relativity, and magnetic fields, but they are not used.

0.5. Even if the author's claim is true, it is poorly substantiated - it is not proven.

1.1. Half of the introduction is about electromagnetic mass - this is off-topic or too difficult for an introduction. This should be in an additional section or appendix.

1.2. Part of the introduction is about directional masses - this is too difficult for an introduction if the article does not deal with Special Relativity. This should be in an additional section or in the appendix. The problem of different directional masses has been solved by appropriate definitions (https://doi.org/10.1016/j.rinp.2021.104121).

1.3. There is too little discussion of the Eötvös experiment, which generally seems to contradict the theses of the article.

1.4. The introduction should contain text from the first half of the Discussion.

2.1. There are no clear operational definitions of F and inertial mass (m:=F/a). It is not possible to loop here (not F:=ma), but a definition of the elastic force of the dynamometer must be provided.

doi.org/10.32388/RM3SUC

2.2. The claim that Newton's second law is just a definition of mass that does not require experimental testing is false. It contradicts Kaufmann's experiment and contradicts the difference between the two masses (transverse and longitudinal).

3.1. The same methodology for defining or measuring mass or force is used as in the cross-section - perhaps only reversed. This cannot be the case if the thesis of the article is to be proven.

3.2. I do not agree with the author that it is impossible to provide an operational definition of passive gravitational mass. For this purpose, weights and a balance scale are sufficient. However, an electronic scale without calibration can measure the gravitational field and the Earth's radius - GERM experiment (DOI: 10.13140/RG.2.2.22066.41924).

3.3. There is no certainty that masses and forces measured at rest (in the field of gravity's acceleration) will be "the same" as during acceleration.

4.1. The discussion is not a discussion, but partly an introduction, abstract, and conclusion.

4.2. A real Discussion should be introduced - based on the methodology of the article and the operational definitions taken (two, not one).

4.3. If the thesis can be reliably proven (and even if not), it should be presented separately in the Conclusions section. This will be section 6, because section 5 should be advanced topics moved from the introduction.

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Declarations

Potential competing interests: No potential competing interests to declare.