

An Experiment for Length Contraction

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CORRECTION¹

There are quite a number of people who claim that we can never truly know whether *length contraction* actually exists or not. Our rulers, they point out, also expand and shrink as our planet changes direction, and since our very systems of measurement are affected, how can we ever measure any difference?

In my article "Faults in Michelson-Morley"² I show, amongst other things, that on grounds of magnitude *length contraction*, as proposed by Lorentz (and Fitzgerald), cannot be a solution to the Michelson-Morley result. This article may well question the need for the idea of *length contraction* in the first place, but it doesn't refute it.

In this short paper I will show, however, that it is possible - theoretically, at least, and probably also practically - to confirm or disprove it.

To begin with let's make sure that we have the same concepts in mind, when speaking about *length contraction*. Its meaning is not exactly self-evident, after all.

We can start by asking the question, "How does *length contraction* work?", or better still, "Where does it work?"

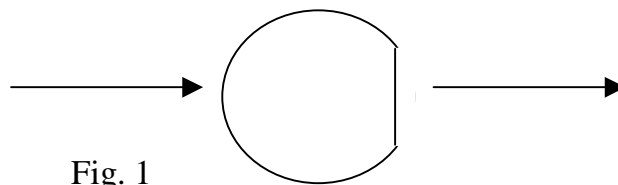


Fig. 1

Fig. 1 suggests one answer, i.e. that the planet earth contracts at its foremost point in the direction of its motion. But this is in fact no answer at all, from a Michelson-Morley standpoint, since their experiment was conducted with one arm of their interferometer necessarily pointing in the direction of motion of the planet. This fact, given the horizontal setup of their equipment, means that their experiment could not be conducted at the foremost point of the planet (D in Fig. 2 below) but had to be - and was - located somewhere on the vertical diameter (e.g. A in Fig. 2 below, with C pointing in the direction of the earth's motion, and B perpendicular to this).

¹ Three months after the first publication of this paper I realized that the experiment would be unable to give conclusive results, for reasons I give at the end of this paper (again in red). The first part on how length contraction works still holds, though for solid bodies as opposed to planets. The author.

² *Faults in Michelson-Morley*, Rothwell Bronrowan, General Science Journal, 20.05.2010

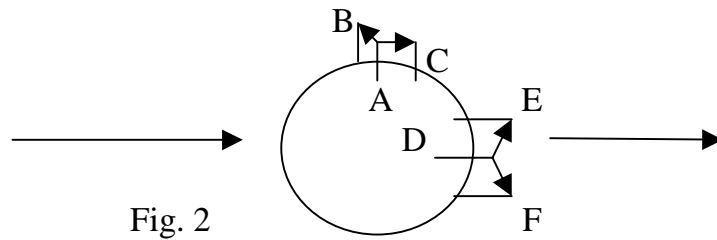


Fig. 2

When I first started thinking about *length contraction* a few months ago, I hit on what I thought was a very good solution, namely *matter displacement*. This was based on the argument that, if the planet contracted in the direction of motion, this "contraction" - a leftwards tendency - would apply to every part of the planet, even to the very last (or leftmost) piece of matter on the planet travelling in this direction. This in turn implied the scenario shown in Fig. 3 below, with everything actually being a bit "left" of its anticipated position.

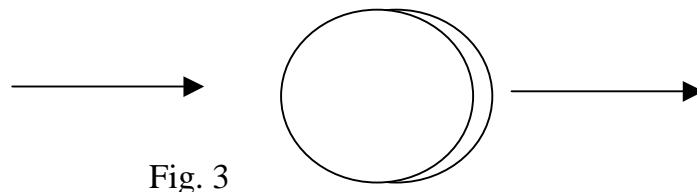


Fig. 3

With the *whole* planet displaced, there is no need for the notion of contraction at all. Instead the implication is that the faster the motion the greater the "lag". This seemed like a nice solution.

But it didn't last long. The next day I realized that, whether it travelled first in the direction of motion and then back or first against the direction of motion and then back, the light would arrive at a Michelson-type detector at exactly the same time, i.e. if there was contraction on one side, then there must also be contraction on the other (Fig. 4).

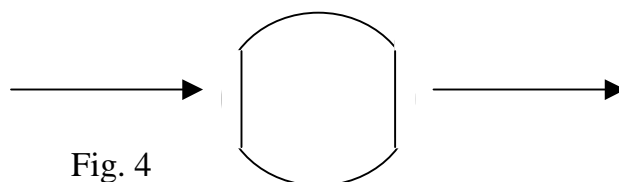


Fig. 4

So displacement doesn't answer the question, "How does *length contraction* work?"

Returning to the above claim that the Michelson-Morley experiment must be located on the vertical diameter of the planet in order for it to function, this location is shown below (Fig. 5) as those points on the planet depicted by the vertical line.

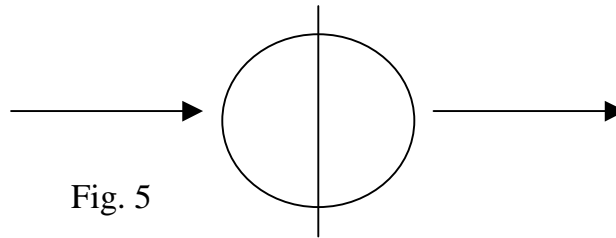


Fig. 5

Comparing figures 4 and 5, it now becomes clear that *length contraction* cannot take place solely at the outermost tips of the planet. Instead it must take place throughout the planet, if it is to affect the Michelson-Morley experiment.

This in turn implies that any two equal "lengths" within the planet (AB and CD in Fig. 6) must experience the same contraction along the line of motion of the planet.

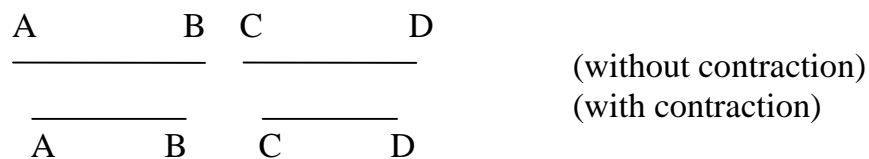


Fig. 6

Notice, however, that if we choose our lengths such that B and C coincide (Fig 7), we arrive at a situation in which expansion takes place between B and C, which contradicts our assumption that the contraction must be uniform throughout.

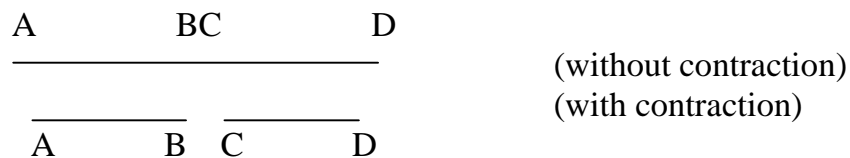


Fig. 7

This forces us to accept that the contraction is evidenced essentially at the outermost points. In other words, no matter how many ABs and CDs we join, all evidence of contraction will normally occur solely at the outermost points A and D.

If we next take AB as the left horizontal radius of the planet and CD as the right horizontal radius, we can now see that B and C contact at the centre of the planet.

If we now allow AB, here, to represent the diameter of the earth along the line of its motion and CD to represent the diameter of the moon along the same line of motion, one can see that, if there is such a thing as *length contraction*, an increase in the distance between point B on the earth and point C on the moon occurs every time this alignment occurs and is also theoretically measurable, by laser for example.

According to my calculations, the difference would be about 15-20 cm. Other calculations suggest around 7 or 8 cm. Either way, this provides a means of confirming or disproving *length contraction*, if not immediately then as soon as our measuring instruments are able to detect a difference of this magnitude in the distance between these two planets.

CORRECTION

The above argument - and test - would apply to a solid body, but probably not to a planet. A "solid body", in this sense, is a body that is more-or-less homogeneous, i.e. a compound, not a mix - like a planet. This test, if conducted "successfully" on a planet - which would mean that no discrepancy would be found in the distances measured between the planets in their various positions - would fail to prove anything since one might equally argue that the solid-body constituents of the planet *did* contract, but that this took place mostly *within* the planet and was not reflected in any measurable change at the surface.

It does, on the other hand, raise questions as to what it *is* that actually contracts, and how. Is wood, for example, a solid body in this sense?
