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Special relativity violates Pascal's law

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Abstract.-The FitzGerald-Lorentz contraction in the direction of relative motion is the starting point of a short and simple argument based on the hydrostatic pressure that formally proves the the theory of special relativity violates Pascal's law. From this violation, the formal inconsistency of the theory of special relativity is immediately demonstrated, an inconsistency for which only its second fundamental principle could be responsible.

Keywords: Hydrostatic pressure, Pascal Law, special relativity, relativistic length contraction, relativistic time dilation, relativistic phase difference in synchronization, principles of special relativity, speed of light.

1. Special relativity violates Pascal's law

Let RF_o, RF_{v1}, and RF_{v2} be three inertial reference frames whose spacial axes coincide at a certain instant and such that RF_o moves relative to RF_{v1} and RF_{v2} parallel to their respective axes X_{v1} and Y_{v2}, and with relative velocities v_1 and v_2, respectively. RF_o is the proper reference frame of a container CO containing a fluid F_1 inside which there is a bubble of another fluid F_2 in static equilibrium with F_1, because both fluids have the same density and are immiscible. According to Pascal's law, the bubble of F_2 will have a perfect spherical shape, since the same pressure acts on each of its points (Figure 1, left).

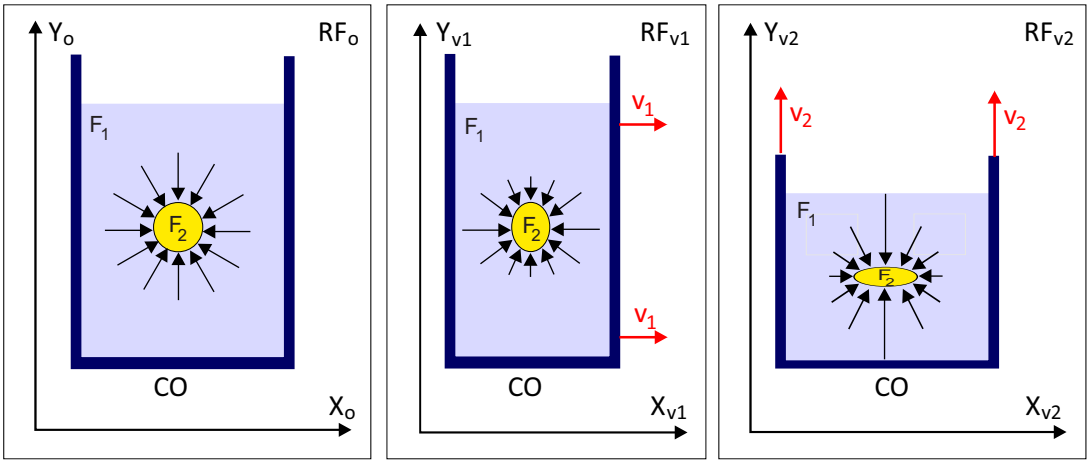

Figure 1 – Left: Fluid bubble F_2 in equilibrium with fluid F_1 in the proper reference frame of both fluids and their container CO. Center and right: the same container and fluids observed from RF_{v1} and RF_{v2}, from whose perspectives RF_o moves in the direction of X_{v1} and Y_{v2} respectively, with velocities v_1 (in the case of RF_{v1}) and v_2 (in the case of RF_{v2}).

However, according to the Lorentz Transformation, in RF_{v1} and in RF_{v2} the bubble will be observed as clearly ellipsoidal in shape, with the minor axis of the respective ellipsoids parallel to the direction of relative motion of RF_o observed from RF_{v1} and RF_{v2}; and the greater the relative velocity at which RF_o is observed, the greater the observed narrowing of the fluid bubble F_2 inside the fluid F_1 (Figure 1 center and right). This deformation of the bubble is not due to a differential force acting only on the bubble: all objects in RF_o, including the fluid container CO and the two fluids F_1 and F_2, move at the same relative velocity with respect to any other inertial reference frame in relative motion with respect to RF_o. The deformations of the bubble F_2 observed in RF_{v1} and RF_{v2} (and in any other inertial reference frame moving relative to RF_o) are relativistic deformations due exclusively to the FitzGerald-Lorentz contraction.

Therefore, Pascal's law does not hold true in RF_{v1} or RF_{v2}, nor in any other inertial reference frame from which RF_o moves relatively with any non-zero velocity vector. Pascal's law only holds

true in the inertial reference frames of the fluids involved, as in the case of RF_o. In addition to these violations of Pascal's law, the F_2 bubble cannot simultaneously have different real shapes, as would be the case if the relativistic contraction of physical objects in relative motion that produces them were real and observed simultaneously at different relative velocities.

Consequently, relativistic contractions of space and physical objects observed from inertial reference frames other than the proper reference frame of those objects can only be apparent, and therefore false, as false as the apparent daily rotation of the Sun around the Earth. Thus, if L_o is the length of any object A in its proper inertial reference frame RF_o, it must also be so in any other inertial reference frame RF_v: $L_v = L_o$, $\forall v$, where v is the relative velocity between RF_v and RF_o.

One could argue that Pascal's law is an exception. But if it were, that exception would have to be explicitly stated in the special theory of relativity, and an explanation would have to be given as to why it is an exception. This is not the case. Furthermore, there are other relativistic violations of other physical laws, such as the laws of reflection [7] and refraction of light [6], or the laws of motion on inclined planes [8].

2. Consequences for the theory of special relativity

(This section partially reproduces a text taken from [8])

Let us consider two inertial reference frames RF_o and RF_v, whose spatial axes coincide at a certain instant and such that RF_o moves relative to RF_v with a uniform velocity v parallel to the axis X_v of RF_v. And let S be a source of photons at rest in RF_o. Suppose that S emits a photon a^* that travels in RF_o a distance d_o to a final screen, which the photon reaches in a time t_o. The speed of light c in RF_o will be: $c = d_o/t_o$. According to the Second Principle of Special Relativity, in RF_v we will have for this photon a^*: $c = d_v/t_v = d_o/t_o$. And since according to the above argument $d_v = d_o$, it will also be $t_v = t_o$, and then:

$$t_v = \gamma\left(t_o + \frac{d_o v^2}{c^2}\right) = t_o \tag{1}$$

which is only possible if $v = 0$ and consequently $\gamma = 1$. Therefore, the only valid measurements of space and time are those made in the proper inertial reference frames of the objects involved. Those made in other inertial reference frames can only be apparent, and therefore false, as false as the apparent refractive distortions of physical objects partially submerged in water.

The theory of special relativity is, therefore, an inconsistent theory. And the reason for its inconsistency cannot be the first of its fundamental principles, which establishes the universality of physical laws, because if that principle were false, the consistent evolution of the universe, for which there is overwhelming empirical evidence, would be impossible. It must therefore be the second of its fundamental principles, a principle that establishes that the speed of light is always the same for all inertial reference frames, regardless of the speed of these inertial reference frames with respect to the light source. The speed of light would always be the same, but THROUGH THE ABSOLUTE REAL PHYSICAL SPACE in which it propagates.

Even if only one of the falsehoods that have just been proven is sufficient to establish both the inconsistent nature of the theory of special relativity and the formal cause of that inconsistency (its second fundamental principle), this last paragraph is included to justify why neither the relativistic increase in mass with velocity nor the relationship between mass and energy has been discussed. The reason is that both results can be formally deduced outside of theory of special relativity [10], [4], [1], [9],[5] [2], [3].

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