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GLOBAL POSITIONING SYSTEM CONFIRMATION OF A CONTRADICTION BETWEEN EINSTEIN'S PREDICTIONS OF TIME DILATION AND REMOTE NON-SIMULTANEITY

Robert J Buenker
University of Wuppertal, Germany

Time dilation and remote non-simultaneity are two of the most famous predictions derived from the Lorentz transformation. As a simple example, consider two lightning strikes which occur at different positions in space. According to Einstein's special theory, the time differences Δt and Δt' measured by two observers between the two strikes must satisfy a strict proportionality relation (time dilation): Δt'=XΔt. In addition, it is claimed by virtue of the corresponding prediction of remote non-simultaneity that the two events can occur simultaneously for one of them (Δt=0) without doing so for the other (Δt'≠0). It is pointed out that it is impossible to satisfy both of the above conditions because that would mean having to violate the algebraic axiom which states that multiplication of any finite number, in this case X, by zero, i.e. Δt in the above equation, must have a product of zero as well, i.e. Δt'=0, in direct contradiction to the prediction of remote non-simultaneity. As a result, the Lorentz transformation itself is shown to be invalid since it is responsible for both predictions. A different space-time transformation is presented which also satisfies both of Einstein's postulates of relativity but without requiring that space and time be mixed. The Hafele-Keating experiments with atomic clocks carried onboard circumnavigating airplanes confirm that time dilation is a real effect, but they also show that the prediction of Einstein's theory that observer can disagree in principle which of two clocks runs slower is not correct. The Global Positioning System makes use of the observed proportionality relationship between elapsed times in the Hafele-Keating experiment to adjust the rates of atomic clocks carried onboard its satellites so that they run at the same rate as identical clocks located on the earth's surface. This practice also serves as verification that remote non-simultaneity has no basis in fact. Otherwise it would make no sense to have the two clocks running at the same rate in order to measure elapsed times for laser beams to travel between the satellite and the ground position.

bobwtal@yahoo.de