

Kinematic Solutions to the Twin Paradox in Special Relativity

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This paper deals with the twin paradox within special relativity. The paper reveals the cause of paradoxical time dilation for an inertial stay-at-home twin, occurring, as believed by a non-inertial travelling twin, throughout his motion except for a short-time turn, though by the return of the travelling twin it is the stay-at-home twin who has aged more. This cause is the unconditional approach to the individual observer's inherent state of rest. Certain kinematic solutions to the paradox are given without resorting to a non-inertial reference frame. The existence of such solutions is shown both in special relativity and in Lorentz ether theory.

As one of the solutions to the twin paradox, an argument is often put forward that the use of inertial reference frames cannot be extended to a twin who if only for a brief period becomes non-inertial. This argument is not actually a solution but rather recognition that it is impossible to solve the paradox applying methods of special relativity. Another solution proceeds from an assumption that time flow rates are different at the points of a traveler-related reference frame, non-inertial during the turn. However, if resorting to such a reference frame is necessary, it only confirms the fact that the solution to the paradox requires going beyond special relativity. With all that, certain kinematic solutions to the twin paradox do exist. The present paper offers two of such solutions. One of them will be dealt with within special relativity, whereas the other will be discussed going back to Lorentz ether theory.

One of the reasons for the paradoxical effects of special relativity is the unconditional approach to the state of proper rest by an observer moving relative to some reference frame. This also applies to the slowness of time flow for the inertial twin who has rapidly grown old. This slowness throughout the period of separation, except for the instantaneous turn, is observed by the twin who has made a round trip to a distant point. Declaring relativity of states of motion and rest, Einsteinian observers always assign the state of rest to themselves and to their reference frames and never do so for the state of motion. Assigning the state of rest to their own reference frames found in a state of mutual relative motion with other reference frames leads to inconsistency of physical quantities. This inconsistency is that each of two unequal quantities is simultaneously larger than the other one. The explanation of such an inconsistency with such comments as "from the point of view of different observers" or "in different reference frames" is routine, though physically not always and not for everyone convincing. The introduction to the relativistic theory of observers who recognize the state of proper motion relative to third party reference frames allows for the solution of the twin paradox to be confined to kinematics of their motion.

The ether theory does not need any tricks to account for the age difference between an inertial and a non-inertial twin who have met each other after parting. The fact that the inertial twin always turns out to have aged more than the non-inertial one at their meeting after parting, in the ether theory is an elementary consequence of the

slowing down of the rate of processes in bodies moving in the ether, which can be shown by means of simple algebraic calculations.

References

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