A Corrected Reanalysis of the Two Swimmers Problem, As Frequent Model of Michelson's Interferometric Experiment

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Abstract. The article initially reviews various works describing the physical model (PM) of Michelson's interferometric experiment (ME), represented by the race between two swimmers Sw1, Sw2 (or boats, or planes, or sound signals, etc.). The two swimmers must each swim the same distance, but Sw1 will go downstream the river flow, and Sw2 will go perpendicularly to this direction. In all such works, it is considered that Sw2's path will require less time and that it will reach the start point first. However, in this work, it has been determined that in order to make this possible, Sw2 must not observe the orthogonality rule of his start direction. This action would be deceitful to the arbiters and thus considered as non-fair-play towards Sw1. In order to obtain a correct result by an analytical calculus, the reference frame (RF) of the space, to which the movements of the relevant bodies or objects are referred to, must be clearly indicated. So, our calculi and geometrical representations of the race paths are made alternatively in the two RFs, available in this physical situation: water-attached frame (WF) and bank-attached frame (BF). The article proves by calculus, that if the fair-play rules are observed, then the correct crosswise path (in WF) is a right triangle instead of the isosceles triangle considered by Michelson (in similar ether-attached frame). Consequently, the two times of the two swimmers, resulted to be perfectly equal and the race ends in a tie, and the myth of Sw2 as the race winner shall be debunked. Note that the same result shall also be applicable to Michelson's interferometric experiment (ME) as well as to any similar experiment. Therefore, utilising the isosceles triangle as the transversal path in PM and also in ME is an erroneous solution.