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Short title: Space-time trigonometry and formalization of the "twin paradox" for uniform and accelerated motions.

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Review text:

This paper is suitable for students and researchers interested in the geometry of Einstein's twin paradox in special relativity.

It begins with a brief historical overview, stressing the importance of hyperbolic numbers for the geometry of Minkowski space-time. Hyperbolic numbers, hyperbolic distance, the geometry of the hyperbolic plane and its sectors, and hyperbolic polar transformations are introduced. Basic hyperbolic trigonometry is explained in analogy to Euclidean trigonometry.

The twin paradox for intertial and accelerated motions is expressed in 2D hyperbolic geometry, always stressing the analogy to Euclidean geometry. Explicit formulas for the proper time difference of the twins are given. Four examples of twins with different uniform and accelerated motions are studied in detail, using hyperbolic trigonometry.

The appendix compares Euclidean and hyperbolic (pseudo-Euclidean) plane rotation invariants and studies a general triangle in the hyperbolic plane in more detail.