

HISTORY OF THE LORENTZ TRANSFORMATION AND ITS FAILURE TO OBEY THE LAW OF CAUSALITY

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ABSTRACT

The experiments which indicated that the speed of light in free space is the same for all observers regardless of their relative state of motion led Voigt to suggest that the classical (Galilean) velocity transformation (GVT) needed to be amended. His solution introduced the concept of space-time mixing, which ultimately became a fundamental characteristic of the Lorentz transformation (LT). Einstein showed that the LT leads directly to the prediction of both FitzGerald-Lorentz length contraction (FLC) and time dilation (TD). Whether these two findings are consistent with the equality of light speed measurements for observers in different rest frames is investigated. In addition, the relevance of the Law of Causality to the assumptions underlying the derivation of the LT is considered in detail.

KEYWORDS: *Law of Causality, Lorentz Transformation (LT), Relativistic Velocity Transformation (RVT), Galilean Velocity Transformation (GVT), Space-Time Mixing, Uniform Scaling Method*

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