The Problem H. Lorentz Encountered in 1890 that was Solved By A. Einstein in 1905

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The trouble we are talking about is pure mathematical in nature. Suppose we have 3-dimensional coordinate system K(x,y,z) that remains at absolute rest.

We have no trouble if we want to change the coordinate system K to the coordinate system K' by the transformation of coordinates: x'=x'(x), y'=y, z'=z that does not depend on time. The K' will also represent the absolute rest. If we have a point in K we can find the corresponding point in K' and back (we suppose that x'=x'(x) can be solved back: x=x(x')).

But suppose we want to introduce another coordinates by the transformation that depends on time: x'=x'(x,t), y'=y, z'=z (for example Galilean transformation: x'=x-Vt). Each point x' that is at rest in K' will be moving in K. That means that K' is no longer represents the absolute rest. If we have a point in K' then we can not find the corresponding point in K unless the time is given. If we have a point in K then in K' it will be a curve – infinite multitude of points. This relation is not acceptable. To one point in one coordinate system it must correspond the one point in another coordinate system. This is the trouble.

This trouble was not much talked about. It was behind the scenes. But it was the real force that made the history of previous century: from H. A. Lorentz to A. Einstein to Now. Do physicists understand the real meaning of SR now?

This trouble can be solved only by using 4-d mathematics and considering time as one of the coordinates. This simple idea introduces the Special Relativity. No postulates necessary. We get the metrics tensor from Maxwell's equations and Lorentz Transformations as the ones that preserve the components of this tensor (similar to the Euclidean metrics tensor and rotations in 3-d space).

The SR is an introduction of 4-d numbers in theoretical physics, and it is pure mathematics. The extraordinary physical consequences were obtained by using this mathematics.