

Avoiding Infinities from the Lorentz and the Poincaré Transformations

Syed Arif Kamal *

Department of Mathematics
University of Karachi, Karachi, Pakistan

From the historical point-of-view, this paper gave history of conceptual development of relativity as well as mathematical formulation of Lorentz transformations. Contrary to the popular belief, giving credit of all contributions in special relativity to Albert Einstein, the paper put into perspective the fundamental conceptual contributions of Muslim scientists, *e. g.*, space and time, relative and absolute, long before, Einstein presented his theory. One year before the publication of Einstein’s paper, Poincaré (1904) enunciated the principle of relativity. Also, complete mathematical framework was available through works of Voigt (1887) and Lorentz (1904). In his paper, ‘Zur Elektrodynamik bewegter Körper’ (On the Electrodynamics of Moving Bodies), published in 1905, Albert Einstein combined these existing conceptual and mathematical formulations into an integrated and a unified approach, without giving reference to these contributions. Herman Minkowski formulated the relativity theory in terms of a four-dimensional-vector-field formulation. On the technical side, the paper focused on the infinities appearing in the Lorentz and the Poincaré transformations of energy and momentum, which caused problems in the formulation of field theories. An attempt was made to avoid these infinities by scaling of coördinates. A practical example was given by applying these scaled-Lorentz transformations to obtain expression of Ohm’s law for relativistically-streaming plasmas containing dyons (particles possessing both the electric and the magnetic charges). This result may find applicability in computational fluid dynamics.

Keywords: Relativity, quantum field theory, infinities, singularities

* Professor Dr. Syed Arif Kamal, MS (Indiana, Bloomington, USA), MA (Johns Hopkins, USA), PhD (Karachi), Department of Mathematics, University of Karachi, *e-mail*: kamal(at the rate of)ngds-ku.org; *paper mail*: University of Karachi, Box 8406, Karachi 75270, Pakistan; *homepage*: <http://ngds-ku.org/kamal>