Sequential relativity

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An alternative velocity addition scheme is proposed consistent with the invariance of the speed of light and the relativity of inertial frames. The proposed rules become identical with the special relativity addition of velocities in (1+1) one dimension.

They also reduce to the Galilean transformation in the low velocity limit.

The reciprocity principle of inertial frames applied to composite velocities leads to uncomfortable paradoxes since the relativistic addition of velocities is neither commutative nor associative. The Thomas rotation has been invoked to produce gyro-commutative and gyro-associative laws.

A major feature of the present proposal is that the addition of velocities is commutative and associative; Therefore, the reciprocity principle for composite velocities is fulfilled.

The transformations can be worked out in a real scator algebra that exhibit group properties in a restricted space although the product is not distributive over addition.

An exceptional consequence is the possibility of longitudinal and transverse velocities both close to c without exceeding the velocity of light in vacuum.

At the fundamental level, two issues are raised

- Quantities that do not possess the quality of direction versus quantities that do have direction. (i.e. scalar and director quantities)
- Freedom of geometrical choice. Elegantly worded by H. Poincaré `` No matter what observational facts are found, the physicist is free to ascribe to physical space any one of the mathematically possible geometrical structures, provided he makes suitable adjustments in the laws of mechanics and optics and consequently in the rules for measuring length''.