

Mixed Number Algebra and Its Application

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Abstract : Mushfiq Ahmad has defined a Mixed Number, which is the sum of a scalar and a Cartesian vector. He has also defined the elementary group operations of Mixed numbers i.e. the norm of Mixed numbers, the product of two Mixed numbers, the identity element and the inverse. It has been observed that Mixed Number is consistent with Pauli matrix algebra and a handy tool to work with Dirac electron theory. Its use as a mathematical method in Physics has been studied. (1) We have applied Mixed number in Quantum Mechanics: Mixed Number version of Displacement operator, Vector differential operator, and Angular momentum operator has been developed. Mixed Number method has also been applied to Klein-Gordon equation. (2) We have applied Mixed number in Electrodynamics: Mixed Number version of Maxwell's equation, the Electric and Magnetic field quantities and Lorentz Force has been found. (3) An associative transformation of Mixed Number numbers fulfilling Lorentz invariance requirement is developed. (4) We have applied Mixed number algebra as an extension of Complex number. Mixed numbers and the Quaternions have isomorphic correspondence, but they are different in algebraic details. The multiplication of unit Mixed number and the multiplication of unit Quaternions are different. Since Mixed Number has properties similar to those of Pauli matrix algebra, Mixed Number algebra is a more convenient tool to deal with Dirac equation.

Keywords : mixed number, special relativity, quantum mechanics, electrodynamics, pauli matrix

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