Recursive formulation of the relativistic law of superposition of multiple collinear velocities

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Abstract

We study the recursive formulation of the law of superposition of multiple collinear velocities. We start with the non-linear equation, transform it into two linear coupled difference equations with variable cofficients, and then decouple these latter equations. The coupled difference equations are solved by three different, but interrelated, methods: (i) via the graph theoretic discrete path approach, (ii) by using the general closed form solution of two coupled first order difference equations with variable coefficients, and (iii) in terms of the symmetric functions via the pochhammers of 2×2 non-autonomous matrices. The solutions of the decoupled equations are factorial polynomials.