

Abstract

An Analysis of the Localized Airy-Laguerre-Gaussian Wave Packets Using Modified One-Parameter Point Symmetries [†]

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In their treatment of the Airy-Laguerre-Gaussian equation, Zhong, Belic and Zhang constructed an alternative solution for the azimuthal case; for the Airy case, they constructed finite pulses. The third case led to the Gaussian, considered to be un-integrable by some. To circumvent the need to construct solutions, which is susceptible to errors, as opposed to quadrature, we introduce the notion of modified one-parameter point symmetries. From this, we demonstrate that there is an error in the traditional solution for linear differential equations, such as the azimuthal equation, as Zhong, Belic and Zhang suspected, and provide the exact result. A finite solution for the Airy equation follows from the inverted monomials of its determining equation. Finally, we integrate the Gaussian integral. As an application, we propose how the analysis can be extended to Newtonian gravitation, and a technology for tapping space energy.



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