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Exact Solutions of the s-Wave Klein-Gordon Equation With the Squared-Cotangent Potential

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Abstract

We present exact solutions of the Klein-Gordon equation in the presence of the squared cotangent potential [1, 2] within the framework of the asymptotic iteration method (AIM). Analytical solutions are derived by initially performing a coordinate transformation that reduces the Klein-Gordon equation to a second-order differential equation of a convenient form. In this context, we report the relativistic energy spectrum and radial wavefunctions for the squared-cotangent potential. These wavefunctions contain special functions that can be defined as hypergeometric functions [3]. It should be noted that AIM [4, 5, 6] is a rigorous and systematic approach to achieve quite reliable and accurate results in terms of modeling important physical systems.

Keywords: Trigonometric potential, asymptotic iteration method, hypergeometric function.

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