

A new approach to solve the one-dimensional Schrodinger equation using a wavefunction potential

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Abstract

A new approach to find exact solutions to one-dimensional quantum mechanical systems is devised. The scheme is based on the introduction of a potential function for the wavefunction, and the equation it satisfies. We recover known solutions as well as to get new ones for both free and interacting particles with wavefunctions having vanishing and non-vanishing Bohm potentials. For most of the potentials, no solutions to the Schrodinger equation produce a vanishing Bohm potential. A (large but) restricted family of potentials allows the existence of particular solutions for which the Bohm potential vanishes. This family of potentials is determined, and several examples are presented. It is shown that some quantum, such as accelerated Airy wavefunctions, are due to the presence of non-vanishing Bohm potentials. New examples of this kind are found and discussed. (C) 2020 Elsevier B.V. All rights reserved.

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