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Quantum mechanics solvable systems with position-dependent effective mass

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Abstract

Considering the position-dependent effective mass in the study of quantum mechanical systems, a wide range of solvable potentials has been obtained. These potentials are obtained by applying canonical transformations to the Schrödinger equation. In this method, the internal functions introduced by Levai for solvable potentials with constant mass have been used, and the eigenfunctions and eigenvalues have been fully obtained. The eigenfunction of these solvable potentials can be obtained based on specific known functions (Jacobian, generalized Laguerre, and Hermit polynomials). Some of these potentials are Scarf-II, Pöschl-Teller, Rosen-Mörse-II and Eckart, whose applications have been described in physical systems. Finally, all the results are placed in a table and the figures of the desired functions is drawn for specific values.

Keywords: position-dependent effective mass, solvable potential, canonical transformations, Schrödinger equation

For full article, refer to the Persian section