



The Schrödinger and Riccati Equations

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Condition: New. Publisher/Verlag: Springer, Berlin | The linear Schrödinger equation is central to Quantum Chemistry. It is presented within the context of relativistic Quantum Mechanics and analysed both in time-dependent and time-independent forms. The Riccati equation is used to study the one-dimensional Schrödinger equation. The authors develop the Schrödinger-Riccati equation as an approach to determine solutions of the time-independent, linear Schrödinger equation. | 1 Introduction.- The Linear Schrödinger Equation.- 2 Derivation of the Schrödinger Equation.- 2.1 The Dirac Equation.- 2.2 The Breit Correction.- 2.3 The Generalized Dirac-Breit Equation.- 2.3.1 Separation of the Coordinates of the Centre of Mass.- 2.3.2 Reduction to Non-Relativistic Form.- 2.4 The Schrödinger Hamiltonian Operator.- 2.4.1 Atoms.- 2.4.2 Molecules.- 2.5 The Invariant Form of the Hamiltonian Operator.- 3 The Schrödinger Equation in Position Space.- 3.1 The Hamiltonian Operator and Its Eigenfunctions.- 3.1.1 The Hamiltonian Operator.- 3.1.2. The Eigenfunctions.- 3.2 Local Properties.- 3.2.1 Nodes and Nodal Planes.- 3.2.2 Local Energies.- 3.2.3 Coalescence and Cusp Conditions.- 3.2.4 Null Kinetic- and Potential-Energy Regions.- 3.3 Global Properties.- 3.3.1 The Potential Energy Hypersurface.- 3.3.2 The Hellmann-Feynman Theorem.- 3.3.3 The Hypervirial Theorem.- 3.3.4 The Virial Theorem.- 4 The Schrödinger Equation In Momentum Space.- 4.1 Introduction.- 4.1.1 The r-Representation versus the p-Representation.- 4.1.2 The...



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