The first part of the book deals with the mathematical formulation of the solutions of Hartree-Fock equations of electrons confined in multiple centered harmonic oscillator potentials with anharmonic terms present. The interaction among electrons is taken as realistic Coloumb interaction. Confinement at four or more centers can be handled with the present algorithm. The trap geometries can be completely anisotropic. Roothaan procedure is used to convert the integro-differential Hartree-Fock equations to matrix algebra equations. Anharmonicities are expressed as polynomials of position operators. Spin orbit effects can also be taken into account with very little modifications. In the second part, the problem of interacting bosons confined in harmonic oscillator potential and interacting with delta function potential is discussed.The basis functions used in Roothaan expansion are the Harmonic oscillator basis functions.
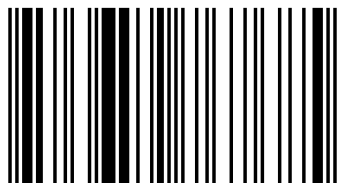
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Interacting Particles Confined in Harmonic Oscillator Potentials