Numerical Calculation of the Energy Spectrum of the Hydrogen Atom and H-like Ions

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A central part of quantum mechanics is Schrodinger's equation. The goal of this present work is to solve this equation to generate with high precision the energy spectrum of the hydrogen atom and H-like ions. The method consists of solving the time-independent Schrodinger equation describing the motion of the electron by using matrix method and B-splines functions. The numerical results obtained for the electronic energies and the wave functions are compared to the other available analytical results. We show the efficiency of the B-splines functions in describing the energy spectrum of the investigated systems with high accuracy.