

# Application of the Fröbenius Method to the Schrödinger Equation

P. Kościk and A. Okopinska

*Institute of Physics, University of Humanities and Sciences  
Swietokrzyska 15, 25-406 Kielce, Poland*

The power series method is adapted to compute the spectrum of the radial Schrödinger equation  $[-\frac{1}{2r} \frac{d^2}{dr^2} r + \frac{l(l+1)}{2r^2} + V(r)]u(r) = Eu(r)$ . Considering two ways of imposing the boundary condition at  $r = R$ , namely  $u(R) = 0$  or  $\frac{du(r)}{dr}|_{r=R} = 0$ , we determine the lower and upper bounds for the eigenvalues as zeros of the calculable functions. This may be performed to arbitrary accuracy, since both functions are given by polynomials. For increasing  $R$ , the exact bound-state energy is approached from both sides monotonically. The generalization to the case of several coupled equations will be discussed and a few case studies will be presented for illustration.

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