New Semiclassical and Numerical Approaches to Locate Zeros of Wave Functions

Asiri Nanayakkara

Institute of Fundamental Studies, Hanthana Road, Kandy, Sri Lanka

Abstract: A new semiclassical method is presented for evaluating zeros of wave functions. In this method, locating zeros of the wave functions of Schrodinger equation is converted to finding roots of a polynomial. The coefficients of this polynomial are evaluated using WKB and semi quantum action variable methods. For certain potentials WKB expressions for moments are obtained exactly. Almost explicit formulae for moments are obtained for the potential $V(x)=x^N$. Examples are given to illustrate both methods. Using semi quantum action variable method, complex zeros of the wave functions of the PT symmetric complex system $V(x)=x^4+i\,Ax$ are obtained. These zeros exhibit complex version of interlacing.

[Full text: PDF]

Close