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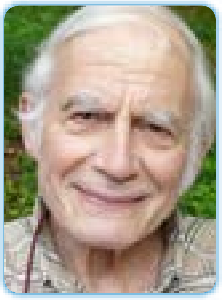

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Spectral computational methods

The spectral computational methods for solving a differential or integral equation are much more efficient, both in the execution time and in the accuracy, than the conventional finite difference algorithms. The main reason is that the spectral methods use information simultaneously from all the mesh points, while the finite difference methods, such as Runge-Kutta or Numerov (based on Taylor's series), can use simultaneously only a restricted number mesh points. Spectral methods, which came into vogue since the 1970's, use expansions into a set of pre determined basis functions, such as Legendre, Lagrange, or Chebyshev polynomials, whose mesh points are carefully chosen according to well established mathematical theorems. Numerical examples for application to physics will be presented, illustrating the advantages and some draw-backs of the spectral methods. They are not difficult to learn or implement.

Biography

George Rawitscher has received his BS degree in Physics and Mathematics at the University of S. Paulo, Brazil in 1949, and PhD in Physics from Stanford University in 1956. After serving on the faculty at Yale University, he moved to the University of Connecticut where he taught for more than 40 years as full Professor. He is now a research Professor at theUniversity of Connecticut since 2009, continuing to do research, and is presently co-authoring a book on spectral computational methods.

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