Scientific computation on mathematical problems and conjectures

Varga, Richard S., author

Abstrak

Studies the use of scientific computation as a tool in attacking a number of mathematical problems and conjectures. In this case, scientific computation refers primarily to computations that are carried out with a large number of significant digits, for calculations associated with a variety of numerical techniques such as the (second) Remez algorithm in polynomial and rational approximation theory, Richardson extrapolation of sequences of numbers, the accurate finding of zeros of polynomials of large degree, and the numerical approximation of integrals by quadrature techniques.
The goal of this book is not to delve into the specialized field dealing with the creation of robust and reliable software needed to implement these high-precision calculations, but rather to emphasize the enormous power that existing software brings to the mathematician's arsenal of weapons for attacking mathematical problems and conjectures.
Scientific Computation on Mathematical Problems and Conjectures includes studies of the Bernstein Conjecture of 1913 in polynomial approximation theory, the "1/9" Conjecture of 1977 in rational approximation theory, the famous Riemann Hypothesis of 1859, and the Polya Conjecture of 1927. The emphasis of this monograph rests strongly on the interplay between hard analysis and high-precision calculations.