Numerical Analysis with Algorithms and Programming
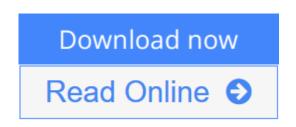
By Santanu Saha Ray

Numerical Analysis with Algorithms and Programming By Santanu Saha Ray

Numerical Analysis with Algorithms and Programming is the first comprehensive textbook to provide detailed coverage of numerical methods, their algorithms, and corresponding computer programs. It presents many techniques for the efficient numerical solution of problems in science and engineering.

Along with numerous worked-out examples, end-of-chapter exercises, and *Mathematica*® programs, the book includes the standard algorithms for numerical computation:

- Root finding for nonlinear equations
- Interpolation and approximation of functions by simpler computational building blocks, such as polynomials and splines
- The solution of systems of linear equations and triangularization
- Approximation of functions and least square approximation
- Numerical differentiation and divided differences
- Numerical quadrature and integration
- Numerical solutions of ordinary differential equations (ODEs) and boundary value problems
- Numerical solution of partial differential equations (PDEs)

The text develops students' understanding of the construction of numerical algorithms and the applicability of the methods. By thoroughly studying the algorithms, students will discover how various methods provide accuracy, efficiency, scalability, and stability for large-scale systems.

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Editorial Review

About the Author

Dr. Santanu Saha Ray is an associate professor in the Department of Mathematics at the National Institute of Technology in Rourkela, India. He is a member of the Society for Industrial and Applied Mathematics and the American Mathematical Society. He is also the editor-in-chief of the *International Journal of Applied and Computational Mathematics* and the author of numerous journal articles and two books: *Graph Theory with Algorithms and Its Applications: In Applied Science and Technology* and *Fractional Calculus with Applications for Nuclear Reactor Dynamics*. His research interests include fractional calculus, mathematical modeling, mathematical physics, stochastic modeling, integral equations, and wavelet transforms. Dr. Saha Ray earned his PhD from Jadavpur University.

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