



Numerical Methods for Chemical Engineers with MATLAB Applications

Alkis Constantinides, Navid Mostoufi

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Master numerical methods using MATLAB, today's leading software for problem solving.

This complete guide to numerical methods in chemical engineering is the first to take full advantage of MATLAB's powerful calculation environment. Every chapter contains several examples using general MATLAB functions that implement the method and can also be applied to many other problems in the same category.

The authors begin by introducing the solution of nonlinear equations using several standard approaches, including methods of successive substitution and linear interpolation; the Wegstein method, the Newton-Raphson method; the Eigenvalue method; and synthetic division algorithms. With these fundamentals in hand, they move on to simultaneous linear algebraic equations, covering matrix and vector operations; Cramer's rule; Gauss methods; the Jacobi method; and the characteristic-value problem. Additional coverage includes:

Finite difference methods, and interpolation of equally and unequally spaced points

Numerical differentiation and integration, including differentiation by backward, forward, and central finite differences; Newton-Cotes formulas; and the Gauss Quadrature

Two detailed chapters on ordinary and partial differential equations

Linear and nonlinear regression analyses, including least squares, estimated vector of parameters, method of steepest descent, Gauss-Newton method, Marquardt Method, Newton Method, and multiple nonlinear regression

The numerical methods covered here represent virtually all of those commonly used by practicing chemical engineers. The focus on MATLAB enables readers to accomplish more, with less complexity, than was possible with traditional FORTRAN. For those unfamiliar with MATLAB, a brief introduction is provided as an Appendix.

Over 60+ MATLAB examples, methods, and function scripts are covered, and all of them are included on the book's CD

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