Introduction to Numerical and Analytical Methods with MATLAB® for Engineers and Scientists

By William Bober

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Introduction to Numerical and Analytical Methods with MATLAB® for Engineers and Scientists provides the basic concepts of programming in MATLAB for engineering applications.

• Teaches engineering students how to write computer programs on the MATLAB platform

• Examines the selection and use of numerical and analytical methods through examples and case studies

• Demonstrates mathematical concepts that can be used to help solve engineering problems, including matrices, roots of equations, integration, ordinary differential equations, curve fitting, algebraic linear equations, and more

The text covers useful numerical methods, including interpolation, Simpson's rule on integration, the Gauss elimination method for solving systems of linear algebraic equations, the Runge-Kutta method for solving ordinary differential equations, and the search method in combination with the bisection method for obtaining the roots of transcendental and polynomial equations. It also highlights MATLAB's built-in functions. These include interp1 function, the quad and dblquad functions, the inv function, the ode45 function, the fzero function, and many others. The second half of the text covers more advanced topics, including the iteration method for solving pipe flow problems, the Hardy-Cross method for solving flow rates in a pipe network, separation of variables for solving partial differential equations, and the use of Laplace transforms to solve both ordinary and partial differential equations.

This book serves as a textbook for a first course in numerical methods using MATLAB to solve problems in mechanical, civil, aeronautical, and electrical

engineering. It can also be used as a textbook or as a reference book in higher level courses.

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Editorial Review

Review

"…provides in a very simple and clear way the first skills in computer programming under the MATLAB platform. The author uses various mathematical concepts (matrices, roots of equations, integration, ordinary differential equations, interpolation, etc.) in order to solve mathematical problems associated with engineering type problems. …the graphic of the work is fairly suggestive and assists a smooth learning."
?*Zentralblatt MATH 1284*

About the Author

William Bober, PhD, received his BS in civil engineering from the City College of New York (CCNY), his MS in engineering science from Pratt Institute, and his PhD in engineering science and aerospace engineering from Purdue University.

He worked as an associate engineering physicist in the Applied Mechanics Department at Cornell Aeronautical Laboratory in Buffalo, New York, was employed as an associate professor in the Department of Mechanical Engineering at the Rochester Institute of Technology, and is an associate professor at Florida Atlantic University (FAU), working in the Department of Mechanical Engineering and the Department of Civil Engineering at FAU.

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