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Advanced engineering mathematics with MATLAB. 5th edition. (English) Zbl 07422133
Advances in Applied Mathematics (Boca Raton). Boca Raton, FL: CRC Press (ISBN 978-0-367-62405-7/hbk). 610 p. (2022)

Publisher's description: In the four previous editions the author presented a text firmly grounded in the mathematics that engineers and scientists must understand and know how to use. Tapping into decades of teaching at the US Navy Academy and the US Military Academy and serving for twenty-five years at (NASA) Goddard Space Flight, he combines a teaching and practical experience that is rare among authors of advanced engineering mathematics books.

This edition offers a smaller, easier to read, and useful version of this classic textbook. While competing textbooks continue to grow, the book presents a slimmer, more concise option. Instructors and students alike are rejecting the encyclopedic tome with its higher and higher price aimed at undergraduates.

To assist in the choice of topics included in this new edition, the author reviewed the syllabi of various engineering mathematics courses that are taught at a wide variety of schools. Due to time constraints an instructor can select perhaps three to four topics from the book, the most likely being ordinary differential equations, Laplace transforms, Fourier series and separation of variables to solve the wave, heat, or Laplace's equation. Laplace transforms are occasionally replaced by linear algebra or vector calculus.

Sturm-Liouville problem and special functions (Legendre and Bessel functions) are included for completeness. Topics such as z -transforms and complex variables are now offered in a companion book, *Advanced Engineering Mathematics: A Second Course* by the same author.

MATLAB is still employed to reinforce the concepts that are taught. Of course, this Edition continues to offer a wealth of examples and applications from the scientific and engineering literature, a highlight of previous editions. Worked solutions are given in the back of the book.

See the reviews of the 2nd and 3rd editions in [[Zbl 1018.00003](#); [Zbl 1210.00010](#)]. For the 4th edition see [[Zbl 1354.00004](#)].

MSC:

- 00A06 Mathematics for nonmathematicians (engineering, social sciences, etc.)
- 33F05 Numerical approximation and evaluation of special functions
- 33F10 Symbolic computation of special functions (Gosper and Zeilberger algorithms, etc.)
- 33F99 Computational aspects of special functions
- 97F50 Real numbers, complex numbers (educational aspects)
- 42A16 Fourier coefficients, Fourier series of functions with special properties, special Fourier series
- 44A10 Laplace transform
- 34B24 Sturm-Liouville theory
- 35L05 Wave equation

Keywords:

complex numbers; line integrals; Cauchy integral formula; residues; complex variables; ordinary differential equations; Euler-Cauchy equation; Fourier series; Fourier transform; Z-transform; Hilbert transform; Sturm-Liouville problem; wave equation; heat equation; Laplace equation; Laplace transform; Heaviside expansion theorem; Dirac delta function; Green functions; Helmholtz equation; vector calculus; line integrals; surface integral; Green lemma; Stokes formula; random process; birth and death processes; random walk; Markov chains; mean and variance; random variables

Software:

[Matlab](#)