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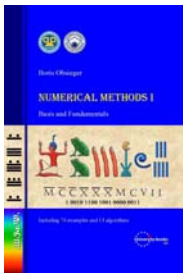

Boris Obsieger

NUMERICAL METHODS I
Basis and Fundamentals

Including 76 examples and 13 algorithms

Textbook at several universities
International edition in English

Chapters:

Numerical Methods I – Basis and Fundamentals

Description:

An excellent textbook established at several universities. Primarily written for students at technical universities, it is also a very useful handbook for engineers, PhD students and scientists. Available in several forms at all continents

Approved by the University of Rijeka, Croatia, 2011-10-10.
Approved by the Faculty of Engineering in Rijeka, Croatia, 2011-09-30.

Approved and recommended by the Moscow State Industrial University, Russia, 2013-10-11.

University of Maribor
Faculty of Logistics

Approved for the study programs on the international basis by the Faculty of Logistic in Celje, Slovenia, 2013-10-11.

This textbook introduces the reader into numeral systems, numbers in computers, types of variables, types of errors and methods for finding roots of polynomials. Error analyses and error estimation are supplemented by various types of regression analyses that are usually used in an experimental work by engineers and scientists.

Why are the presented topics so important? Simply, they are common to all numerical methods. Possibly, the most important parts are the descriptions of differences between constant (non-random) and random variables, related types of errors and error propagations. Engineers and scientists sometimes ignore the difference between variables of different types, roughly interpreting all variables in their computations as the constant variables. The consequence of such an approach is a wrong interpretation and estimation of the computation error. By understanding the sources and types of errors, they can be controlled and possibly reduced. That is of crucial importance in almost all applications.

The book is divided into seven chapters. In the first chapter, the historical background and basic properties of various numeral systems, as well as conversion of numbers from one system to another are briefly explained. In the second chapter, numbers in digital computers, namely integers and floating point numbers are described. This helps the reader to choose precision and range limits of stored numbers. The third chapter explains constant variables and related numerical errors, including error propagation and algorithm instability. The forth and fifth chapters explain random variables and related random errors, uncertainty, confidence level, as well as propagation of random errors. Various types of regression analyses of experimental data are described in the sixth chapter. Direct methods for finding roots of third and forth degree polynomials are described in the seventh chapter, followed by general iterative methods for polynomials of any degree.

Practical application of the adopted knowledge is supported by 76 examples and 13 algorithms. In addition, the given text with 75 figures and 40 tables represents a valuable background for understanding, applying and developing various numerical analyses.

Editions:

This textbook is written in English
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