

**René Alt
Andreas Frommer
R. Baker Kearfott
Wolfram Luther (Eds.)**

LNCS 2991

Numerical Software with Result Verification

**International Dagstuhl Seminar
Dagstuhl Castle, Germany, January 2003
Revised Papers**



Springer

Numerical Software With Result Verification

Edgar Kaucher

Numerical Software With Result Verification:

Numerical Software with Result Verification René Alt,Andreas Frommer,R. Baker Kearfott,Wolfram Luther,2004-02-12
Reliable computing techniques are essential if the validity of the output of a merical algorithm is to be guaranteed to be correct Our society relies more and more on computer systems Usually our systems appear to work successfully but there are sometimes serious and often minor errors Validated computing is one essential technology to achieve increased software reliability Formal gor in the de nition of data types the computer arithmetic in algorithm design and in program execution allows us to guarantee that the stated problem has or does not have a solution in an enclosing interval we compute If the enclosure is narrow we are certain that the result can be used Otherwise we have a clear warning that the uncertainty of input values might be large and the algorithm and the model have to be improved The use of interval data types and al rithms with controlled rounding and result veri cation capture uncertainty in modeling and problem formulation in model parameter estimation in algorithm truncation in operation round o and in model interpretation The techniques of validated computing have proven their merits in many scienti c and engineering applications They are based on solid and interesting theoretical studies in mathematics and computer science Contributions from elds including real complex and functional analysis semigroups probability statistics fuzzyintervalanalysis fuzzylogic automaticdi erentiation computer hardware operating systems compiler construction programming languages object oriented modeling parallel processing and software engineering are all essential *Numerical Software with Result Verification* René Alt,2004-03-12 This book constitutes the thoroughly refereed post proceedings of the Dagstuhl Seminar 03041 on Numerical Software with Result Verification held at Dagstuhl Castle Germany in January 2003 The 18 revised full papers presented were selected during two rounds of reviewing and improvements The papers are organized in topical sections on languages software systems and tools new verification techniques based on interval arithmetic applications in science and engineering and novel approaches to verification

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of integrals derivatives and elementary and special functions Computer Arithmetic, Scientific Computation and Mathematical Modelling Edgar Kaucher,1991 Production and Assessment of Numerical Software M. A. Hennell,L. M. Delves,1980 Analysis of numerical software Software verification Software portability Design of software libraries

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