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Computer Algebra

2013-06-29

the journal computing has established a series of supplement volumes the fourth of which appears this year its purpose is to provide a coherent presentation of a new topic in a single volume the previous subjects were computer arithmetic 1977 fundamentals of numerical computation 1980 and parallel processes and related automata 1981 the topic of this 1982 supplementum to computing is computer algebra this subject which emerged in the early nineteen sixties has also been referred to as symbolic and algebraic computation or formula manipulation algebraic algorithms have been receiving increasing interest as a result of the recognition of the central role of algorithms in computer science they can be easily specified in a formal and rigorous way and provide solutions to problems known and studied for a long time whereas traditional algebra is concerned with constructive methods computer algebra is furthermore interested in efficiency in implementation and in hardware and software aspects of the algorithms it develops that in deciding effectiveness and determining efficiency of algebraic methods many other tools recursion theory logic analysis and combinatorics for example are necessary in the beginning of the use of computers for symbolic algebra it soon became apparent that the straightforward textbook methods were often very inefficient instead of turning to numerical approximation methods computer algebra studies systematically the sources of the inefficiency and searches for alternative algebraic methods to improve or even replace the algorithms

Computer Algebra With Symbolicc++

2008-09-04

this book gives a comprehensive introduction to computer algebra together with advanced topics in this field it provides a detailed coverage of the mathematics of computer algebra as well as a step by step guide to implement a computer algebra system in the object oriented language c the used tools from c are introduced in detail numerous examples from mathematics physics and engineering are presented to illustrate the system s capabilities computer algebra implementations in lisp and haskell are also included in addition gene expression programming and multiexpression programming with applications to computer algebra are introduced

Computer Algebra Systems

1999-07-16

this thorough overview of the major computer algebra symbolic mathematical systems compares and contrasts their

strengths and weaknesses and gives tutorial information for using these systems in various ways compares different packages quantitatively using standard test suites ideal for assessing the most appropriate package for a particular user or application examines the performance and future developments from a user s and developer s viewpoint internationally recognized specialists overview both the general and special purpose systems and discuss issues such as denesting nested roots complex number calculations efficiently computing special polynomials solving single equations and systems of polynomial equations computing limits multiple integration solving ordinary differential and nonlinear evolution equations code generation evaluation and computer algebra in education the historical origins computer algebra resources and equivalents for many common operations in seven major packages are also covered by providing such a comprehensive survey the experienced user is able to make an informed decision on which system s he or she might like to use it also allows a user new to computer algebra to form an idea of where to begin since each system looked at in this book uses a different language many examples are included to aid the user in adapting to these language differences these examples can be used as a guide to using the various systems once one understands the basic principles of one cas the book also includes contributions which look at the broad issues of the needs of various users and future developments both from the user s and the developer s viewpoint the author is a leading figure in the development and analysis of mathematical software and is well known through the wester test suite of problems which provide a bench mark for measuring the performance of mathematical software systems the book will help develop our range of titles for applied mathematcians the book will provide a unique fully up to date and independent assessment of particular systems and will be of interest to users and purchasers of cas s

Applications of Computer Algebra

2012-12-06

today certain computer software systems exist which surpass the computational ability of researchers when their mathematical techniques are applied to many areas of science and engineering these computer systems can perform a large portion of the calculations seen in mathematical analysis despite this massive power thousands of people use these systems as a routine resource for everyday calculations these software programs are commonly called computer algebra systems they have names such as macsyma maple mumath reduce and smp they are receiving credit as a computational aid with in creasing regularity in articles in the scientific and engineering literature when most people think about computers and scientific research these days they imagine a machine grinding away processing numbers arithmetically it is not generally realized that for a number of years computers have been performing non numeric computations this means for example that one inputs an equa tion and obtains a closed

form analytic answer it is these computer algebra systems their capabilities and applications which are the subject of the papers in this volume

Computer Algebra and Symbolic Computation

2003-01-03

mathematica maple and similar software packages provide programs that carry out sophisticated mathematical operations applying the ideas introduced in computer algebra and symbolic computation elementary algorithms this book explores the application of algorithms to such methods as automatic simplification polynomial decomposition and polyno

Computer Algebra Handbook

2012-12-06

this handbook gives a comprehensive snapshot of a field at the intersection of mathematics and computer science with applications in physics engineering and education reviews 67 software systems and offers 100 pages on applications in physics mathematics computer science engineering chemistry and education

Computer Algebra In Science And Engineering

1995-08-31

systems and tools of computer algebra like axiom derive form mathematica maple mupad reduce macsyma let us manipulate extremely complex algebraic formulae symbolically on a computer contrary to numerics these computations are exact and there is no loss of accuracy after decades of research and development these tools are now becoming as indispensable in science and engineering as traditional number crunching already is the zif 94 workshop is amongst the first devoted specifically to applications of computer algebra ca in science and engineering the book documents the state of the art in this area and serves as an important reference for future work

Explorations in Calculus with a Computer Algebra System

1990-01-01

now in its third edition this highly successful textbook is widely regarded as the bible of computer algebra

Modern Computer Algebra

2013-04-25

although scientific computing is very often associated with numeric computations the use of computer algebra methods in scientific computing has obtained considerable attention in the last two decades computer algebra methods are especially suitable for parametric analysis of the key properties of systems arising in scientific computing the expression based computational answers generally provided by these methods are very appealing as they directly relate properties to parameters and speed up testing and tuning of mathematical models through all their possible behaviors this book contains 8 original research articles dealing with a broad range of topics ranging from algorithms data structures and implementation techniques for high performance sparse multivariate polynomial arithmetic over the integers and rational numbers over methods for certifying the isolated zeros of polynomial systems to computer algebra problems in quantum computing

Computer Algebra in Scientific Computing

2019-11-04

this book provides a systematic approach for the algorithmic formulation and implementation of mathematical operations in computer algebra programming languages the viewpoint is that mathematical expressions represented by expression trees are the data objects of computer algebra programs and by using a few primitive operations that analyze and

Computer Algebra and Symbolic Computation

2002-07-19

computer algebra systems allow students to work on mathematical models more efficiently than in the case of pencil and paper the use of such systems also leads to fewer errors and enables students to work on complex and computationally intensive models aimed at undergraduates in their second or third year this book is filled with examples from a wide variety of disciplines including biology economics medicine engineering game theory physics and chemistry the text includes a large number of maple r recipes

Computer Algebra Recipes

2013-03-07

casc 2001 continues a tradition started in 1998 of international con ferences on the latest advances in the application of computer algebra systems to the solution of various problems in scientific computing the three ear cass lier conferences in this sequence casc 98 casc 99 and casc 2000 were held petersburg russia in munich germany and in samarkand respectively in st uzbekistan and proved to be very successful we have to thank the program committee listed overleaf for a tremendous job in soliciting and providing reviews for the submitted papers there were more than three reviews per submission on average the result of this job is reflected in the present volume which contains revised versions of the accepted papers the collection of papers included in the proceedings covers various topics of computer algebra methods algorithms and software applied to scientific computing in particular five papers are devoted to the implementation of the analysis of involutive systems with the aid of casso the specific examples include new efficient algorithms for the computation of janet bases for monomial ideals involutive division involutive reduction method etc a number of papers deal with application of cass for obtaining and vali dating new exact solutions to initial and boundary value problems for partial differential equations in mathematical physics several papers show how cass can be used to obtain analytic solutions of initial and boundary value problems for ordinary differential equations and for studying their properties

Computer Algebra in Scientific Computing CASC 2001

2012-12-06

this book constitutes the refereed proceedings of the 11th international workshop on computer algebra in scientific computing casc 2009 held in kobe japan in september 2009 the 28 revised full papers presented together with 2 invited lectures were carefully reviewed and selected from numerous submissions the topics addressed are all basic areas of scientific computing as they benefit from the application of computer algebra methods and software the papers cover computer algebra methods and algorithms application of symbolic and algebraic manipulation and ca methods and results for the numerical integration of the partial differential equations of the mathematical physics

Calculus

1994

proceedings of the third workshop on computer algebra in scientific computing samarkand octobe5r 5 9 2000

Computer Algebra in Scientific Computing

2009-09-30

the book has the dual goal of showing how computer algebra can play an important role in applied mathematics while introducing the reader to the computer system macsyma which is designed to support such computations in order to provide realistic applications of computer algebra the level of the mathematical treatment must be substantially beyond a first course in calculus thus this book is aimed at a reader who has had at least three years of college level calculus and differential equations currently computer algebra is a rarely used research tool but the author believes it is destined for a major roll in engineering and applied mathematics it will not be long before computer algebra is as common to an engineering student as the now obsolete slide rule once was

Computer Algebra in Scientific Computing

2000-09-27

algebra and number theory have always been counted among the most beautiful mathematical areas with deep proofs and elegant results however for a long time they were not considered that important in view of the lack of real life applications this has dramatically changed nowadays we find applications of algebra and number theory frequently in our daily life this book focuses on the theory and algorithms for polynomials over various coefficient domains such as a finite field or ring the operations on polynomials in the focus are factorization composition and decomposition basis computation for modules etc algorithms for such operations on polynomials have always been a central interest in computer algebra as it combines formal the variables and algebraic or numeric the coefficients aspects the papers presented were selected from the workshop on computer algebra and polynomials which was held in linz at the johann radon institute for computational and applied mathematics ricam during november 25 29 2013 at the occasion of the special semester on applications of algebra and number theory

Computer Algebra in Applied Mathematics

1984

the advent of highly accessible computer algebra systems and very sophisticated calculators has led educators to reevaluate how calculus should be taught uniquely designed for use with computer algebra systems and sophisticated calculators this course also works well with a computer laboratory the students are encouraged to use technology for manual computation while they rapidly progress through the concepts of differential and integral

calculus mathematical modeling and optimization ordinary differential equations differential calculus for vector valued and multi variable functions the students will progress to vector geometry and coordinate systems two and three dimensional graphical display multiple integration vector fields and line integrals and on to fourier series and the fourier expansion theorem

Computer Algebra and Polynomials

2015-01-20

this textbook offers an algorithmic introduction to the field of computer algebra a leading expert in the field the author guides readers through numerous hands on tutorials designed to build practical skills and algorithmic thinking this implementation oriented approach equips readers with versatile tools that can be used to enhance studies in mathematical theory applications or teaching presented using mathematica code the book is fully supported by downloadable sessions in mathematica maple and maxima opening with an introduction to computer algebra systems and the basics of programming mathematical algorithms the book goes on to explore integer arithmetic a chapter on modular arithmetic completes the number theoretic foundations which are then applied to coding theory and cryptography from here the focus shifts to polynomial arithmetic and algebraic numbers with modern algorithms allowing the efficient factorization of polynomials the final chapters offer extensions into more advanced topics simplification and normal forms power series summation formulas and integration computer algebra is an indispensable resource for mathematics and computer science students new to the field numerous examples illustrate algorithms and their implementation throughout with online support materials to encourage hands on exploration prerequisites are minimal with only a knowledge of calculus and linear algebra assumed in addition to classroom use the elementary approach and detailed index make this book an ideal reference for algorithms in computer algebra

Calculus

2012-02-15

this book constitutes the refereed proceedings of the 13th international workshop on computer algebra in scientific computing casc 2011 held in kassel germany in september 2011 the 26 full papers included in the book were carefully reviewed and selected from numerous submissions the articles are organized in topical sections on the development of object oriented computer algebra software for the modeling of algebraic structures as typed objects matrix algorithms the investigation with the aid of computer algebra the development of symbolic numerical

algorithms and the application of symbolic computations in applied problems of physics mechanics social science and engineering

Computer Algebra

2021-08-12

this book presents the basic concepts and algorithms of computer algebra using practical examples that illustrate their actual use in symbolic computation a wide range of topics are presented including groebner bases real algebraic geometry lie algebras factorization of polynomials integer programming permutation groups differential equations coding theory automatic theorem proving and polyhedral geometry this book is a must read for anyone working in the area of computer algebra symbolic computation and computer science

Computer Algebra in Scientific Computing

2011-08-26

this book corresponds to a mathematical course given in 1986 87 at the university louis pasteur strasbourg this work is primarily intended for graduate students the following are necessary prerequisites a few standard definitions in set theory the definition of rational integers some elementary facts in combinatorics maybe only newton s binomial formula some theorems of analysis at the level of high schools and some elementary algebra basic results about groups rings fields and linear algebra an important place is given to exercises these exercises are only rarely direct applications of the course more often they constitute complements to the text mostly hints or references are given so that the reader should be able to find solutions chapters one and two deal with elementary results of number theory for example the euclidean algorithm the chinese remainder theorem and fermat s little theorem these results are useful by themselves but they also constitute a concrete introduction to some notions in abstract algebra for example euclidean rings principal rings algorithms are given for arithmetical operations with long integers the rest of the book chapters 3 through 7 deals with polynomials we give general results on polynomials over arbitrary rings then polynomials with complex coefficients are studied in chapter 4 including many estimates on the complex roots of polynomials some of these estimates are very useful in the subsequent chapters

Some Tapas of Computer Algebra

2013-03-09

this book constitutes the proceedings of the 20th international workshop on computer algebra in scientific computing casc 2018 held in lille france in september 2018 the 24 full papers of this volume presented with an abstract of an invited talk and one paper corresponding to another invited talk were carefully reviewed and selected from 29 submissions they deal with cutting edge research in all major disciplines of computer algebra in sciences such as physics chemistry life sciences and engineering chapter positive solutions of systems of signed parametric polynomial inequalities is available open access under a creative commons attribution 4 0 international license via link springer com

Mathematics for Computer Algebra

2012-12-06

this book presents a large number of computer algebra worksheets or recipes that have been designed using maple to provide tools for problem solving and to stimulate critical thinking no prior knowledge of maple is necessary all relevant commands are introduced on a need to know basis and are indexed for easy reference each recipe features a scientific model or method and an interesting or amusing story designed to both entertain and enhance concept comprehension and retention

Computer Algebra in Scientific Computing

2018-09-03

this book constitutes the refereed proceedings of the 10th international workshop on computer algebra in scientific computing casc 2007 held in bonn germany in september 2007 the volume is dedicated to professor vladimir p gerdt on the occasion of his 60th birthday the 35 revised full papers presented were carefully reviewed and selected from numerous submissions for inclusion in the book the papers cover not only various expanding applications of computer algebra to scientific computing but also the computer algebra systems themselves and the ca algorithms topics addressed are studies in polynomial and matrix algebra quantifier elimination and gröbner bases as well as stability investigation of both differential equations and difference methods for them several papers are devoted to the application of computer algebra methods and algorithms to the derivation of new mathematical models in biology and in mathematical physics

Computer Algebra Recipes

2007-12-31

the chapter on statistical physics simulations has been enlarged mainly by a dis cussion of multispin coding techniques for the ising model bit by bit parallel oper ations in the chapter about reduce some details of the presentation have been cor rected or clarified the new operator mateigen for the computation of eigenvec tors of matrices is explained the first chapter and the appendix remain unchanged needless to say the field of computational science is advancing so quickly for ex ample with the development of parallel as opposed to vectorized algorithms that it will not be too long before a further edition is called for cologne march 1989 the authors preface to the first edition computers play an increasingly important role in many of today s activities and correspondingly physicists find employment after graduation in computer related jobs often quite remote from their physics education the present lectures on the other hand emphasize how we can use computers for the purposes of fundamental research in physics thus we do not deal with programs designed for newspapers banks or travel agencies i e word processing and storage of large amounts of data

Computer Algebra in Scientific Computing

2007-09-12

symbolic c an introduction to computer algebra using object oriented programming provides a concise introduction to c and object oriented programming using a step by step construction of a new object oriented designed computer algebra system symbolic c it shows how object oriented programming can be used to implement a symbolic algebra system and how this can then be applied to different areas in mathematics and physics this second revised edition explains the new powerful classes that have been added to symbolic c includes the standard template library extends the java section contains useful classes in scientific computation contains extended coverage of maple mathematica reduce and mupad

Computer Simulation and Computer Algebra

2012-12-06

the development of powerful computer algebra systems has considerably ex tended the scope of problems of scientific computing which can now be solved successfully with the aid of computers however as the field of applications of computer algebra in scientific computing becomes broader and more complex there is a danger of

separation between theory systems and applications for this reason we felt the need to bring together the researchers who now ap ply the tools of computer algebra for the solution of problems in scientific computing in order to foster new and closer interactions casc 99 is the second conference devoted to applications of computer al gebra in scientific computing the first conference in this sequence casc 98 was held 20 24 april 1998 in st petersburg russia this volume contains revised versions of the papers submitted by the par ticipants and accepted by the program committee after a thorough reviewing process the collection of papers included in the proceedings covers various topics of computer algebra methods algorithms and software applied to scien tific computing symbolic numeric analysis and solving differential equations efficient computations with polynomials groups matrices and other related objects special purpose programming environments application to physics mechanics optics and to other areas in particular a significant group of papers deals with applications of com puter algebra methods for the solution of current problems in group theory which mostly arise in mathematical physics

SymbolicC++:An Introduction to Computer Algebra using Object-Oriented Programming

2012-12-06

the book focuses on advanced computer algebra methods and special functions that have striking applications in the context of quantum field theory it presents the state of the art and new methods for infinite multiple sums multiple integrals in particular feynman integrals difference and differential equations in the format of survey articles the presented techniques emerge from interdisciplinary fields mathematics computer science and theoretical physics the articles are written by mathematicians and physicists with the goal that both groups can learn from the other field including most recent developments besides that the collection of articles also serves as an up to date handbook of available algorithms software that are commonly used or might be useful in the fields of mathematics physics or other sciences

Computer Algebra in Scientific Computing CASC'99

2012-12-06

this comprehensive book illustrates how mathcad can be used to solve many mathematical tasks and provides the mathematical background to the mathcad package based on the latest version 8 professional for windows this book market contains many solutions to basic mathematical tasks and is designed to be used as both a reference and tutorial for lecturers and students as well as a practical manual for engineers mathematicians and computer

scientists

Computer Algebra in Quantum Field Theory

2013-10-05

this volume consists of papers presented in the special sessions on complex and numerical analysis value distribution theory and complex domains and use of symbolic computation in mathematics education of the isaac 97 congress held at the university of delaware during june 2 7 1997 the isaac congress coincided with a u s japan seminar also held at the university of delaware the latter was supported by the national science foundation through grant int 9603029 and the japan society for the promotion of science through grant mtcs 134 it was natural that the participants of both meetings should interact and consequently several persons attending the congress also presented papers in the seminar the success of the isaac congress and the u s japan seminar has led to the isaac 99 congress being held in fukuoka japan during august 1999 many of the same participants will return to this seminar indeed it appears that the spirit of the u s japan seminar will be continued every second year as part of the isaac congresses we decided to include with the papers presented in the isaac congress and the u s japan seminar several very good papers by colleagues from the former soviet union these participants in the isaac congress attended at their own expense

Calculus

1994

the central problem considered in this introduction for graduate students is the determination of rational parametrizability of an algebraic curve and in the positive case the computation of a good rational parametrization this amounts to determining the genus of a curve its complete singularity structure computing regular points of the curve in small coordinate fields and constructing linear systems of curves with prescribed intersection multiplicities the book discusses various optimality criteria for rational parametrizations of algebraic curves

Practical Use of Mathcad®

2012-12-06

algorithms for computer algebra is the first comprehensive textbook to be published on the topic of computational symbolic mathematics the book first develops the foundational material from modern algebra that is required for

subsequent topics it then presents a thorough development of modern computational algorithms for such problems as multivariate polynomial arithmetic and greatest common divisor calculations factorization of multivariate polynomials symbolic solution of linear and polynomial systems of equations and analytic integration of elementary functions numerous examples are integrated into the text as an aid to understanding the mathematical development the algorithms developed for each topic are presented in a pascal like computer language an extensive set of exercises is presented at the end of each chapter algorithms for computer algebra is suitable for use as a textbook for a course on algebraic algorithms at the third year fourth year or graduate level although the mathematical development uses concepts from modern algebra the book is self contained in the sense that a one term undergraduate course introducing students to rings and fields is the only prerequisite assumed the book also serves well as a supplementary textbook for a traditional modern algebra course by presenting concrete applications to motivate the understanding of the theory of rings and fields

Recent Developments in Complex Analysis and Computer Algebra

2013-12-01

ordinary differential equations have been studied by mathematicians for many years and the standard techniques have been either by series expansions or by numerical methods computer algebra has introduced an alternative means of treating differential equations and solving them more readily this volume assembles contributions from leading mathematicians in this growing field of computer algebra

Rational Algebraic Curves

2007-12-10

for several years now i have been teaching courses in computer algebra at the universitat linz the university of delaware and the universidad de alcala de henares in the summers of 1990 and 1992 i have organized and taught summer schools in computer algebra at the universitat linz gradually a set of course notes has emerged from these activities people have asked me for copies of the course notes and different versions of them have been circulating for a few years finally i decided that i should really take the time to write the material up in a coherent way and make a book out of it here now is the result of this work over the years many students have been helpful in improving the quality of the notes and also several colleagues at linz and elsewhere have contributed to it i want to thank them all for their effort in particular i want to thank b buchberger who taught me the theory of grabner bases nearly two decades ago b f caviness and b d saunders who first stimulated my interest in various problems in computer algebra

g e collins who showed me how to compute in algebraic domains and j r sendra with whom i started to apply computer algebra methods to problems in algebraic geometry several colleagues have suggested improvements in earlier versions of this book however i want to make it clear that i am responsible for all remaining mistakes

Algorithms for Computer Algebra

2007-06-30

the goal of computer algebra concepts and techniques is to demystify computer algebra systems for a wide audience including students faculty and professionals in scientific fields such as computer science mathematics engineering and physics unlike previous books the only prerequisites are knowledge of first year calculus and a little programming experience a background that can be assumed of the intended audience the book is written in a lean and lively style with numerous examples to illustrate the issues and techniques discussed it presents the principal algorithms and data structures while also discussing the inherent and practical limitations of these systems

Computer Algebra and Differential Equations

1989

this is a standalone but the recipes are correlated with topics found in standard texts and make use of maple release 7 as a reference text or self study guide this book is useful for science professionals and engineers good for the classroom correlates with topics found in standard classical mechanics texts this book makes use of the powerful computer algebra system maple release 7 but no prior knowledge of maple is presumed the relevant command structures are explained on a need to know basis as the recipes are developed thus making this a standalone text

Polynomial Algorithms in Computer Algebra

2012-12-06

this book constitutes the proceedings of the 14th international workshop on computer algebra in scientific computing casc 2012 held in maribor slovenia in september 2012 the 28 full papers presented were carefully reviewed and selected for inclusion in this book one of the main themes of the casc workshop series namely polynomial algebra is represented by contributions devoted to new algorithms for computing comprehensive gröbner and involutive systems parallelization of the gröbner bases computation the study of quasi stable polynomial ideals new algorithms to compute the jacobson form of a matrix of ore polynomials a recursive leverrier algorithm for inversion of dense

matrices whose entries are monic polynomials root isolation of zero dimensional triangular polynomial systems optimal computation of the third power of a long integer investigation of the complexity of solving systems with few independent monomials the study of ill conditioned polynomial systems a method for polynomial root finding via eigen solving and randomization an algorithm for fast dense polynomial multiplication with java using the new opaque typed method and sparse polynomial powering using heaps

Computer Algebra

2019-01-15

Computer Algebra Recipes for Classical Mechanics

2012-12-06

Computer Algebra in Scientific Computing

2012-08-30

- calculus early transcendentals 10th edition anton solutions [PDF]
- quantum cosmology core (2023)
- passover is coming very first board books (Read Only)
- monitor troubleshooting guide (2023)
- survival analysis in r openintro [PDF]
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