Handbook Of Elliptic And Hyperelliptic Curve Cryptography Second Edition Discrete Mathematics And Its Applications

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Handbook Of Elliptic And Hyperelliptic Curve Cryptography Second Edition Discrete Mathematics And Its Applications 2024-03-12

MARTINEZ GLASS

5th International Conference, Cologne, Germany, May 16-18, 2012, Revised Selected Papers
Springer
The discrete logarithm problem based on elliptic and hyperelliptic curves has gained a lot of popularity as a cryptographic primitive. The main reason is that no subexponential algorithm for computing discrete logarithms on small genus curves is currently available, except in very special cases. Therefore curve-based cryptosystems require much smaller key sizes than RSA to attain the same security level. This makes them particularly attractive for implementations on memory-restricted devices like smart cards and in high-security applications. The Handbook of Elliptic and Hyperelliptic Curve

Cryptography introduces the theory and algorithms involved in curve-based cryptography. After a very detailed exposition of the mathematical background, it provides ready-to-implement algorithms for the group operations and computation of pairings. It explores methods for point counting and constructing curves with the complex multiplication method and provides the algorithms in an explicit manner. It also surveys generic methods to compute discrete logarithms and details index calculus methods for hyperelliptic curves. For some special curves the discrete logarithm problem can be transferred to an easier one; the consequences are explained and suggestions for good choices are given. The authors present applications to protocols for discrete-logarithm-based systems (including bilinear structures) and explain the use of elliptic and hyperelliptic curves in factorization and primality proving. Two chapters explore their design and efficient implementations in smart cards. Practical and theoretical aspects of side-channel attacks and countermeasures and a chapter devoted to

(pseudo-)random number generation round off the exposition. The broad coverage of all- important areas makes this book a complete handbook of elliptic and hyperelliptic curve cryptography and an invaluable reference to anyone interested in this exciting field.

7th International Symposium, ANTS-VII, Berlin, Germany, July 23-28, 2006, Proceedings Springer

Handbook of Elliptic and Hyperelliptic Curve Cryptography CRC Press

Information Security and Privacy Springer

The AFRICACRYPT 2008 conference was held during June 11–14, 2008 in Casablanca, Morocco. Upon the initiative of the organizers from the Ecole n- male sup´ erieure in Casablanca, this event was the ?rst international research conference in Africa dedicated to cryptography. The conference was honored by the presence of the invited speakers Bruce Schneier, Jacques Stern, and Alexander W. Dent who gave talks entitled “The Psychology of Security” “Modern Cryptography: A Historical Perspective” and “ABriefHistory ofProvably-SecurePublic-KeyEncryption ”,respectively. These proceedings include papers

by Bruce Schneier and by Alexander Dent. The conference received 82 submissions on November 24, 2007. They went through a careful doubly anonymous review process. This was run by the iChair software written by Thomas Baign` eres and Matthieu Finiasz. Every paper - ceived at least three review reports. After this period, 25 papers were accepted on February 12, 2008. Authors then had the opportunity to update their papers until March 13, 2008. The present proceedings include all the revised papers. At the end of the review process, the paper entitled "An Authentication Protocol with Encrypted Biometric Data" written by Julien Bringer and Herv´ e Chabanne was elected to receive the Africacrypt 2008 Best Paper Award. I had the privilege to chair the Program Committee. I would like to thank all committee members for their tough work on the submissions, as well as all externalreviewersfortheirsupport.Ialsothankmyassistant ThomasBaign` eres formaintainingtheserverandhelpingmetorunthesoftware.Ithanktheinvited speakers, the authors of the best paper, the authors of all submissions. They all contributed to the success of the

conference. **Mathematics of Public Key Cryptography** Springer Science & Business Media
This book constitutes the proceedings of the 21st International Conference on Selected Areas in Cryptography, SAC 2014, held in Montreal, QC, Canada, in August 2014. The 22 papers presented in this volume were carefully reviewed and selected from 103 submissions. There are four areas covered at each SAC conference. The three permanent areas are: design and analysis of symmetric key primitives and cryptosystems, including block and stream ciphers, hash function, MAC algorithms, cryptographic permutations, and authenticated encryption schemes; efficient implementations of symmetric and public key algorithms; mathematical and algorithmic aspects of applied cryptology. This year, the fourth area for SAC 2014 is: algorithms for cryptography, cryptanalysis and their complexity analysis. **First International Workshop, WAIFI 2007, Madrid, Spain, June 21-22, 2007, Proceedings** IOS Press
Like its bestselling predecessor, Elliptic Curves: Number Theory and Cryptography, Second Edition develops the theory of

elliptic curves to provide a basis for both number theoretic and cryptographic applications. With additional exercises, this edition offers more comprehensive coverage of the fundamental theory, techniques, and applications of elliptic curves. New to the Second Edition Chapters on isogenies and hyperelliptic curves A discussion of alternative coordinate systems, such as projective, Jacobian, and Edwards coordinates, along with related computational issues A more complete treatment of the Weil and Tate–Lichtenbaum pairings Doud's analytic method for computing torsion on elliptic curves over Q An explanation of how to perform calculations with elliptic curves in several popular computer algebra systems Taking a basic approach to elliptic curves, this accessible book prepares readers to tackle more advanced problems in the field. It introduces elliptic curves over finite fields early in the text, before moving on to interesting applications, such as cryptography, factoring, and primality testing. The book also discusses the use of elliptic curves in Fermat's Last Theorem. Relevant abstract algebra

material on group theory and fields can be found in the appendices.

Win--Women in Numbers

Springer

This book constitutes the thoroughly refereed post-conference proceedings of the 18th Annual International Workshop on Selected Areas in Cryptography, SAC 2011, held in Toronto, Canada in August 2011. The 23 revised full papers presented together with 2 invited papers were carefully reviewed and selected from 92 submissions. The papers are organized in topical sections on cryptanalysis of hash functions, security in clouds, bits and randomness, cryptanalysis of ciphers, cryptanalysis of public-key crypthography, cipher implementation, new designs and mathematical aspects of applied cryptography.

Second International Conference, Egham, UK, September 1-3, 2008, Proceedings

Springer

The two-volume set LNCS 8269 and 8270 constitutes the refereed proceedings of the 19th International Conference on the Theory and Application of Cryptology and Information, Asiacrypt 2013, held in Bengaluru, India, in December 2013. The 54 revised full papers presented

were carefully selected from 269 submissions. They are organized in topical sections named: zero-knowledge, algebraic cryptography, theoretical cryptography, protocols, symmetric key cryptanalysis, symmetric key cryptology: schemes and analysis, side-channel cryptanalysis, message authentication codes, signatures, cryptography based upon physical assumptions, multi-party computation, cryptographic primitives, analysis, cryptanalysis and passwords, leakage-resilient cryptography, two-party computation, hash functions.

12th International Conference on the Theory and Application of Cryptology and Information Security, Shanghai, China, December 3-7, 2006, Proceedings

CRC Press

This book constitutes the refereed proceedings of the 26th Annual International Conference on the Theory and Applications of Cryptographic Techniques, EUROCRYPT 2007, held in Barcelona, Spain in May 2007. The 33 revised full papers address all current foundational, theoretical and research aspects of cryptology, cryptography, and cryptanalysis as well as advanced applications. First

International Conference on Cryptology in Africa, Casablanca, Morocco, June 11-14, 2008, Proceedings Springer
The volume is a collection of 20 refereed articles written in connection with lectures presented at the 12th International Conference on Finite Fields and Their Applications ("Fq12") at Skidmore College in Saratoga Springs, NY in July 2015. Finite fields are central to modern cryptography and secure digital communication, and hence must evolve rapidly to keep pace with new technologies. Topics in this volume include cryptography, coding theory, structure of finite fields, algorithms, curves over finite fields, and further applications. Contributors will include: Antoine Joux (Fondation Partenariale de l'UPMC, France); Gary Mullen (Penn State University, USA); Gohar Kyureghyan (Otto-von-Guericke Universität, Germany); Gary McGuire (University College Dublin, Ireland); Michel Lavrauw (Università degli Studi di Padova, Italy); Kirsten Eisentraeger (Penn State University, USA); Renate Scheidler (University of Calgary, Canada); Michael Zieve (University of Michigan, USA). Contents:Divisibility of L-Polynomials

for a Family of Curves (I Blanco-Chacón, R Chapman, S Fordham and G McGuire)Divisibility of Exponential Sums Associated to Binomials Over $\mathbb{F}_p$ (F Castro, R Figueroa, P Guan and J Ortiz-Ubarri)Dickson Polynomials that are Involutions (P Charpin, S Mesnager and S Sarkar)Constructing Elliptic Curves and Curves of Genus 2 over Finite Fields (K Eisenträger)A Family of Plane Curves with Two or More Galois Points in Positive Characteristic (S Fukasawa)Permutation Polynomials of $\mathbb{F}_{q^2}$ of the Form $\alpha X + X^{r(q-1)+1}$ (X-D Hou)Character Sums and Generating Sets (M-D A Huang and L Liu)Nearly Sparse Linear Algebra and Application to Discrete Logarithms Computations (A Joux and C Pierrot)Full Degree Two del Pezzo Surfaces over Small Finite Fields (A Knecht and K Reyes)Diameter of Some Monomial Digraphs (A Kodess, F Lazebnik, S Smith and J Sporre)Permutation Polynomials of the Form $X + \gamma \mathrm{Tr}(X^k)$ (G Kyureghyan and M Zieve)Scattered Spaces in Galois Geometry (M Lavrauw)On the Value Set of Small Families of Polynomials over a Finite Field, III (G Matera, M Pérez and Melina Privitelli)The

Density of Unimodular Matrices over Integrally Closed Subrings of Function Fields (G Micheli and R Schnyder)Some Open Problems Arising from My Recent Finite Field Research (G L Mullen)On Coefficients of Powers of Polynomials and Their Compositions over Finite Fields (G L Mullen, A Muratović-Ribić and Q Wang)On the Structure of Certain Reduced Linear Modular Systems (E Orozco)Finding a Gröbner Basis for the Ideal of Recurrence Relations on m-Dimensional Periodic Arrays (I M Rubio, M Sweedler and C Heegard)An Introduction to Hyperelliptic Curve Arithmetic (R Scheidler)On the Existence of Aperiodic Complementary Hexagonal Lattice Arrays (Y Tan and G Gong) Readership: Researchers in combinatorics and graph theory, numerical analysis and computational mathematics, and coding theory.

Third International Conference Palo Alto, CA, USA, August 12-14, 2009 Proceedings

Springer Science & Business Media

This book offers the beginning undergraduate student some of the vista of modern mathematics by developing and presenting the tools needed to gain an

understanding of the arithmetic of elliptic curves over finite fields and their applications to modern cryptography. This gradual introduction also makes a significant effort to teach students how to produce or discover a proof by presenting mathematics as an exploration, and at the same time, it provides the necessary mathematical underpinnings to investigate the practical and implementation side of elliptic curve cryptography (ECC). Elements of abstract algebra, number theory, and affine and projective geometry are introduced and developed, and their interplay is exploited. Algebra and geometry combine to characterize congruent numbers via rational points on the unit circle, and group law for the set of points on an elliptic curve arises from geometric intuition provided by Bézout's theorem as well as the construction of projective space. The structure of the unit group of the integers modulo a prime explains RSA encryption, Pollard's method of factorization, Diffie–Hellman key exchange, and ElGamal encryption, while the group of points of an elliptic curve over a finite field motivates Lenstra's

elliptic curve factorization method and ECC. The only real prerequisite for this book is a course on one-variable calculus; other necessary mathematical topics are introduced on-the-fly. Numerous exercises further guide the exploration. Advances in Cryptology -- ASIACRYPT 2006 Springer This book constitutes the refereed proceedings of the 12th International Conference on the Theory and Application of Cryptology and Information Security, held in Shanghai, China, December 2006. The 30 revised full papers cover attacks on hash functions, stream ciphers, biometrics and ECC computation, id-based schemes, public-key schemes, RSA and factorization, construction of hash function, protocols, block ciphers, and signatures. *Research Directions in Number Theory* Springer Developments of the last few decades in digital communications have created a close link between mathematics and areas of computer science and electrical engineering. A collaboration between such areas now seems very natural, due to problems which require deep knowledge and expertise in each area.

Algebra and some of its branches, such as algebraic geometry, computational algebra, group theory, etc., have played a special role in such collaboration.

8th International Symposium, ANTS-VIII Banff, Canada, May 17-22, 2008 Proceedings

Springer Science & Business Media

This book constitutes the refereed proceedings of the 5th International Conference on Pairing-Based Cryptography, Pairing 2012, held in Cologne, Germany, in May 2012. The 17 full papers for presentation at the academic track and 3 full papers for presentation at the industrial track were carefully reviewed and selected from 49 submissions. These papers are presented together with 6 invited talks. The contributions are organized in topical sections on: algorithms for pairing computation, security models for encryption, functional encryption, implementations in hardware and software, industry track, properties of pairings, and signature schemes and applications.

Handbook of Elliptic Integrals for Engineers and Physicists

Springer Science & Business Media

In an age of explosive worldwide growth of

electronic data storage and communications, effective protection of information has become a critical requirement. When used in coordination with other tools for ensuring information security, cryptography in all of its applications, including data confidentiality, data integrity, and user authentication, is a most powerful tool for protecting information. This book presents a collection of research work in the field of cryptography. It discusses some of the critical challenges that are being faced by the current computing world and also describes some mechanisms to defend against these challenges. It is a valuable source of knowledge for researchers, engineers, graduate and doctoral students working in the field of cryptography. It will also be useful for faculty members of graduate schools and universities.

Algorithmic Number Theory

Springer Nature

After two decades of research and development, elliptic curve cryptography now has widespread exposure and acceptance. Industry, banking, and government standards are in place to facilitate extensive deployment of this efficient public-key mechanism. Anchored by a

comprehensive treatment of the practical aspects of elliptic curve cryptography (ECC), this guide explains the basic mathematics, describes state-of-the-art implementation methods, and presents standardized protocols for public-key encryption, digital signatures, and key establishment. In addition, the book addresses some issues that arise in software and hardware implementation, as well as side-channel attacks and countermeasures. Readers receive the theoretical fundamentals as an underpinning for a wealth of practical and accessible knowledge about efficient application. Features & Benefits: * Breadth of coverage and unified, integrated approach to elliptic curve cryptosystems * Describes important industry and government protocols, such as the FIPS 186-2 standard from the U.S. National Institute for Standards and Technology * Provides full exposition on techniques for efficiently implementing finite-field and elliptic curve arithmetic * Distills complex mathematics and algorithms for easy understanding * Includes useful literature references, a list of algorithms, and appendices on sample parameters, ECC

standards, and software tools This comprehensive, highly focused reference is a useful and indispensable resource for practitioners, professionals, or researchers in computer science, computer engineering, network design, and network data security. First International Workshop, WAIFI 2007, Madrid, Spain, June 21-22, 2007, Proceedings Springer This book constitutes the refereed proceedings of the 22nd International Conference on Information and Communications Security, ICICS 2020, held in Copenhagen, Denmark*, in August 2020. The 33 revised full papers were carefully selected from 139 submissions. The papers focus in topics about computer and communication security, and are organized in topics of security and cryptography. *The conference was held virtually due to the COVID-19 pandemic. **Pairing-Based Cryptography – Pairing 2008** World Scientific This volume is a collection of papers on number theory which evolved out of the workshop WIN--Women In Numbers, held November 2-7, 2008, at the Banff International Research Station (BIRS) in Banff, Alberta, Canada. It includes

articles showcasing outcomes from collaborative research initiated during the workshop as well as survey papers aimed at introducing graduate students and recent PhDs to important research topics in number theory. The contributions in this volume span a wide range of topics in arithmetic geometry and algebraic, algorithmic, and analytic number theory. Clusters of papers center around the four topics of moduli spaces and Shimura curves, curves and Jacobians over finite fields, Galois covers of function fields in positive characteristic, and zeta functions of graphs, with a fifth group of three individual articles on modular forms, Iwasawa theory, and Galois representations, respectively. The workshop and this volume are part of a broader WIN initiative, whose goals are to highlight and increase the research activities of women in number theory and to train female graduate students in number theory and related fields.

Mathematics

Springer

This book constitutes the refereed proceedings of the 7th International Conference on the Theory and Application of Cryptographic Techniques in

Africa, AFRICACRYPT 2014, held in Marrakesh, Morocco in May 2014. The 26 papers presented together with 1 invited talk were carefully reviewed and selected from 83 submissions. The aim of Africa crypt 2014 is to provide an international forum for practitioners and researchers from industry, academia and government from all over the world for a wide ranging discussion of all forms of cryptography and its applications as follows: Public-Key Cryptography, Hash Functions, Secret-Key Cryptanalysis, Number Theory, Hardware Implementation, Protocols and Lattice-based Cryptography. 4th International Conference, ACNS 2006, Singapore, June 6-9, 2006, Proceedings BoD – Books on Demand Pairing-based cryptography is at the very leading edge of the current wave in computer cryptography. That makes this book all the more relevant, being as it is the refereed proceedings of the First International Conference on Pairing-Based Cryptography, Pairing 2007, held in Tokyo, Japan in 2007. The 18 revised full papers presented together were carefully reviewed and selected from 86 submissions. The papers are organized in topical sections

including those on applications, and certificateless public key encryption.

Encyclopedia of Cryptography and Security

Chapman and Hall/CRC

This book constitutes the refereed proceedings of the 11th IMA International Conference on Cryptography and Coding, held in Cirencester, UK in December 2007. The 22 revised full papers presented together with two invited contributions were carefully reviewed and selected from 48 submissions. The papers are organized in topical sections on signatures, boolean functions, block cipher cryptanalysis, side channels, linear complexity, public key encryption, curves, and RSA implementation.