Table of Contents of Volume I

Preface xiii

History and Significance xiv

Committees xvi

Congress Programme xvii

Acknowledgements xxi

EMS Prize Winners xxiii

Felix Klein Prize Winner xxviii

Opening Ceremony

Address by Sebastià Xambó xxix

Address by Ramón Marimón xxxiii

Address by Andreu Mas-Colell xxxiv

Address by Joan Clos xxxv

Address by Rolf Jeltsch xxxvii

Address by Manuel Castellet xxxix

Closing Ceremony

Address by Sebastià Xambó xlv

Address by Rolf Jeltsch xlviii

Articles by Plenary Speakers

Robbert Dijkgraaf
The Mathematics of M-Theory 1

Hans Föllmer
Probabilistic Aspects of Financial Risk 21

Hendrik W. Lenstra, Jr.
Flags and Lattice Basis Reduction 37

Yuri I. Manin
Moduli, Motives, Mirrors 53

Yves Meyer
The Role of Oscillations in Some Nonlinear Problems 75

Carles Simó
New Families of Solutions in N-Body Problems 101

Marie-France Vignéras
Irreducible Modular Representations of a Reductive p-Adic Group and Simple Modules for Hecke Algebras 117

Oleg Viro
Dequantization of Real Algebraic Geometry on Logarithmic Paper 135

Articles by Parallel Speakers

Rudolf Ahlswede
Advances on Extremal Problems in Number Theory and Combinatorics 147

Volker Bach
Spectral Analysis of Nonrelativistic Quantum Electrodynamics 177

Viviane Baladi
Spectrum and Statistical Properties of Chaotic Dynamics 203

Joaquim Bruna
Sampling in Complex and Harmonic Analysis 225

Nicolas Burq
Lower Bounds for Shape Resonance Widths of Schrödinger Operators 247

Xavier Cabré
A Conjecture of De Giorgi on Symmetry for Elliptic Equations in $\mathbb{R}^n$ 259

Peter J. Cameron
The Random Graph Revisited 267

Zoé Chatzidakis
Difference Fields: Model Theory and Applications to Number Theory 275

Ciro Ciliberto
Geometric Aspects of Polynomial Interpolation in More Variables and of Waring's Problem 289

Gianni Dal Maso
The Calibration Method for Free Discontinuity Problems 317

Jan Denef and François Loeser
Geometry on Arc Spaces of Algebraic Varieties 327

Barbara Fantechi
Stacks for Everybody 349

Alexander B. Goncharov
Multiple ζ-Values, Galois Groups, and Geometry of Modular Varieties 361
Alexander Grigor'yan
Heat Kernels on Manifolds, Graphs and Fractals 393
Michael Harris
Local Langlands Correspondences and Vanishing Cycles on Shimura Varieties 407
Renato Iturriaga and Konstantin Khanin
Burgers Turbulence and Dynamical Systems 429
Kurt Johansson
Random Growth and Random Matrices 445
Pekka Koskela
Sobolev Spaces and Quasiconformal Mappings on Metric Spaces 457
Nicholas S. Manton and Bernard M. A. G. Piette
Understanding Skyrmions Using Rational Maps 469
Ieke Moerdijk
Models for the Leaf Space of a Foliation 481
Eric M. Opdam
Multivariable Hypergeometric Functions 491
Thomas Peternell
Contact Structures, Rational Curves and Mori Theory 509
Alexander Reznikov
Analytic Topology 519
Bernhard Schmidt
Towards Ryser's Conjecture 533
Klaus Schmidt
The Dynamics of Algebraic $\mathbb{Z}^d$-Actions 543
Bálint Tóth
Self-Interacting Random Motions 555
Erik van den Ban and Henrik Schlichtkrull
Harmonic Analysis on Reductive Symmetric Spaces 565

Table of Contents of Volume II

Articles by Prize Winners

Semyon Alesker
Classification Results on Valuations on Convex Sets 1

Raphaël Cerf
Towards a Microscopic Theory of Phase Coexistence 9

Dominic Joyce
Constructing Compact 8-Manifolds with Holonomy Spin(7)
from Calabi-Yau Orbifolds 21

Vincent Lafforgue
Banach KK-Theory and the Baum-Connes Conjecture 31

Michael McQuillan
An Introduction to Non-Commutative Mori Theory 47

Stefan Nemirovski
Geometric Methods in Complex Analysis 55

Paul Seidel
Vanishing Cycles and Mutation 65

Wendelin Werner
Critical Exponents, Conformal Invariance and Planar Brownian Motion 87

Mini-Symposium on Computer Algebra

Manuel Bronstein
Computer Algebra Algorithms for Linear Ordinary
Differential and Difference Equations 105

Wolfram Decker
Some Introductory Remarks on Computer Algebra 121

Gaston H. Gonnet
A Study of Iteration Formulas for Root Finding,
Where Mathematics, Computer Algebra and Software Engineering Meet 143

Laureano González-Vega and Tomás Recio
Industrial Applications of Computer Algebra:
Climbing Up a Mountain, Going Down a Hill 157

Gert-Martin Greuel
Applications of Computer Algebra to Algebraic Geometry,
Singularity Theory and Symbolic-Numerical Solving 169

Mini-Symposium on Curves over Finite Fields and Codes

Noam D. Elkies
Explicit Towers of Drinfeld Modular Curves 189

Arnaldo Garcia
Curves over Finite Fields Attaining the Hasse-Weil Upper Bound 199

Farshid Hajir and Christian Maire
Asymptotically Good Towers of Global Fields 207

Henning Stichtenoth
Explicit Constructions of Towers of Function Fields with Many Rational Places 219

Gerard van der Geer
Curves over Finite Fields and Codes 225

Chaoping Xing
Authentication Codes and Algebraic Curves 239

Mini-Symposium on Free Boundary Problems

Giovanni Bellettini
Some Aspects of Mean Curvature Flow in Presence of Nonsmooth Anisotropies 245

Klaus Deckelnick
A Phase-Field Model for Diffusion-Induced Grain Boundary Motion 255

Irina V. Denisova
Evolution of a Closed Interface between Two Liquids of Different Types 263

Gonzalo Galiano
Applications of a Local Energy Method to Systems of PDE's Involving Free Boundaries 273

Harald Garcke
Phase Boundaries in Alloys with Elastic Misfit 281

Josephus Hulshof
Some Aspects of the Thin Film Equation 291

Regis Monneau
A Brief Overview on the Obstacle Problem 303

Henrik Shahgholian
The Impact of Monotonicity Formulas in Regularity of Free Boundaries 313

José Miguel Urbano
A Free Boundary Problem: Contributions from Modern Analysis 319

Mini-Symposium on Mathematical Finance: Theory and Practice

Tomasz R. Bielecki and Stanley R. Pliska
Risk Sensitive Control with Applications to Fixed Income Portfolio Management 331

M. A. H. Dempster and A. Eswaran
Wavelet Based PDE Valuation of Derivatives 347

Ernst Eberlein and Sebastian Raible
Some Analytic Facts on the Generalized Hyperbolic Model 367

Hélyette Geman
Functionals of Brownian Motion in Path-Dependent Option Valuation 379

Ton Vorst
Optimal Portfolios under a Value at Risk Constraint 391

Mini-Symposium on Quantum Chaology

Eugene Bogomolny
Trace Formulas and Spectral Statistics of Diffractive Systems 399

Monique Combescure and Didier Robert
Semiclassical Results in the Linear Response Theory 413

Jens Marklof
The Berry-Tabor Conjecture 421

Zeév Rudnick
On Quantum Unique Ergodicity for Linear Maps of the Torus 429

Mini-Symposium on Quantum Computing

Nicolas Gisin, Renato Renner and Stefan Wolf
Bound Information: The Classical Analog to Bound Quantum Entanglement 439

Mini-Symposium on String Theory and M-Theory

Michael R. Douglas
D-Branes on Calabi-Yau Manifolds 449

José M. F. Labastida
Knot Invariants and Chern-Simons Theory 467

Marcos Mariño
Topological Quantum Field Theory and Four-Manifolds 479

Christoph Schweigert and Jürgen Fuchs
D-Brane Conformal Field Theory and Bundles of Conformal Blocks 489

Angel M. Uranga
From Quiver Diagrams to Particle Physics 499

Mini-Symposium on Symplectic and Contact Geometry and Hamiltonian Dynamics

Paul Biran
From Symplectic Packing to Algebraic Geometry and Back 507
Yuri Chekanov
New Invariants of Legendrian Knots 525
Hansjörg Geiges
Contact Topology in Dimension Greater than Three 535
Viktor L. Ginzburg
The Hamiltonian Seifert Conjecture: Examples and Open Problems 547
Àngel Jorba and Jordi Villanueva
The Fine Geometry of the Cantor Families of Invariant Tori in Hamiltonian Systems 557
Mikhail B. Sevryuk
Symplectic and Contact Geometry and Hamiltonian Dynamics 565
Vladimir Zakalyukin
Simple Coisotropic Projections and Caustics 575

Mini-Symposium on Wavelet Applications in Signal Processing

Eric Chassande-Mottin and Patrick Flandrin
Reassigned Scalograms and Singularities 583
Peter F. Craigmile, Donald B. Percival and Peter Guttorp
The Impact of Wavelet Coefficient Correlations on Fractionally Differenced Process Estimation 591
Emma J. McCoy
Wavelet-Based Modelling of Persistent Periodicities 601
Rudolf H. Riedi, Vinay J. Ribeiro, Matthew S. Crouse and Richard G. Baraniuk
Network Traffic Modeling Using a Multifractal Wavelet Model 609
Vasily Strela
Denoising Via Block Wiener Filtering in Wavelet Domain 619
Andrew T. Walden
Wavelet Analysis of Discrete Time Series 627