New Publications Offered by the AMS

Algebra and Algebraic Geometry

Abelian Groups, Rings and Modules

A. V. Kelarev, University of Tasmania, Hobart, Tasmania, Australia; R. Göbel, University of Essen, Germany; K. M. Rangaswamy, University of Colorado, Colorado Springs, P. Schultz, The University of Western Australia, Nedlands, and C. Vinsonhaler, University of Connecticut, Storrs, Editors

This volume presents the proceedings from the conference on Abelian Groups, Rings, and Modules (AGRAM) held at the University of Western Australia (Perth). Included are articles based on talks given at the conference, as well as a few specially invited papers. The proceedings are dedicated to Professor László Fuchs. The book includes a tribute and a review of his work by his long-time collaborator, Professor Luigi Salce.

Four surveys from leading experts follow Professor Salce’s article. They present recent results from active research areas:
- Error correcting codes as ideals in group rings,
- Duality in module categories,
- Automorphism groups of abelian groups, and
- Generalizations of isomorphism in torsion-free abelian groups.

In addition to these surveys, the volume contains 22 research articles in diverse areas connected with the themes of the conference. The areas discussed include abelian groups and their endomorphism rings, modules over various rings, commutative and non-commutative ring theory, varieties of groups, and topological aspects of algebra. The book offers a comprehensive source for recent research in this active area of study.

Contents: Introduction: L. Salce, László Fuchs and his “moddom” work; Survey articles: A. V. Kelarev and P. Solé, Error-correcting codes as ideals in group rings; B. Olberding, Homomorphisms and duality for torsion-free modules; K. C. O’Meara and C. Vinsonhaler, Generalizations of isomorphism in torsion-free abelian groups; P. Schultz, Automorphism groups of abelian groups; Contributed papers: D. M. Arnold, Direct sum decompositions of torsion-free abelian groups of finite rank; M. A. Aviño and P. Schultz, The endomorphism ring of a bounded abelian p-group; E. Blagoveshchenskaya, G. Ivanov, and P. Schultz, The Baer-Kaplansky theorem for almost completely decomposable groups; A. Blass and J. Irwin, Maximal pure independent sets; D. Dikranjan and M. Tkachenko, Characterization of the tori via density of the solution set of linear equations; A. A. Fomin, Quotient divisible mixed groups; L. Fuchs and S. B. Lee, Stacked bases over h-local Prüfer domains; A. J. Giovannitti, Groups with locally defined heights and products of \( \mathbb{R}^+ \) groups; R. Göbel and S. Shelah, Reflexive subgroups of the Baer-Specker group and Martin’s axiom; P. Hill, C. Megibben, and W. Ullery, \( \Sigma \)-isotype subgroups of local k-groups; G. Ivanov, Character modules and endomorphism rings of modules over Artinian serial rings; P. Loth, Topologically pure extensions; N. R. McConnell and T. Stokes, Rings having simple adjacent semigroup; A. Mader, L. G. Nongxa, and M. A. Ould-Beddi, Invariants of global crq-groups; V. H. Mikaelian, On varieties of groups generated by wreath products of abelian groups; O. Mutzbauer, Existence of rigid indecomposable almost completely decomposable groups; W. K. Nicholson and M. F. Youssif, \( C_2 \)-rings and the FGF-conjecture; B. L. Osofsky, Lifting direct sum decompositions of bounded abelian p-groups; K. M. Rangaswamy, On modules and submodules with finite projective dimension; L. Struengmann and S. L. Wallace, On the torsion groups in cotorsion classes; J. Trlifaj, Cotorsion theories induced by tilting and cotilting modules; J. Žemlička, Steadiness is tested by a single module.

Contemporary Mathematics, Volume 273

New Publications Offered by the AMS

Analysis

Laguerre Calculus and Its Applications on the Heisenberg Group
Carlos Berenstein, University of Maryland, College Park, Der-Chen Chang, Georgetown University, Washington, DC, and Jingzhi Tie, University of Georgia, Athens

For nearly two centuries, the relation between analytic functions of one complex variable, their boundary values, harmonic functions, and the theory of Fourier series has been one of the central topics of study in mathematics. The topic stands on its own, yet also provides very useful mathematical applications.

This text provides a self-contained introduction to the corresponding questions in several complex variables: namely, analysis on the Heisenberg group and the study of the solutions of the boundary Cauchy-Riemann equations. In studying this material, readers are exposed to analysis in non-commutative compact and Lie groups, specifically the rotation group and the Heisenberg groups—both fundamental in the theory of group representations and physics.

Introductions in a concrete setting are the main ideas of the Calderon-Zygmund-Steen school of harmonic analysis. Also considered in the book are some less conventional problems of harmonic and complex analysis, in particular, the Morera and Pompeiu problems for the Heisenberg group, which relates to questions in optics, tomography, and engineering.

The book was borne of graduate courses and seminars held at the University of Maryland (College Park), the University of Toronto (ON), Georgetown University (Washington, DC), and the University of Georgia (Athens). Readers should have an advanced undergraduate understanding of Fourier analysis and complex analysis in one variable.

Contents: The Laguerre calculus; Estimates for powers of the sub-Laplacian; Estimates for the spectrum projection operators of the sub-Laplacian; The inverse of the operator $\Box_{\alpha} = \sum_{j=1}^{n} (X_j^2 - X_j^{2}X_{\alpha}) - 2i\alpha$; The explicit solution of the $\Box_{\alpha}$-Neumann problem in a non-isotropic Siegel domain; Injectivity of the Pompeiu transform in the isotropic $H_{\alpha}$; Morera-type theorems for holomorphic $MP$ spaces in $H_{\alpha}$ (I); Morera-type theorems for holomorphic $MP$ spaces in $H_{\alpha}$ (II).

AMS/IP Studies in Advanced Mathematics, Volume 22
All AMS members $51, List $64, Order code AMSIP/22N

Function Theory of Several Complex Variables

Second Edition

Steven G. Krantz, Washington University, St. Louis, MO

This work departs from earlier treatments of the subject by emphasizing integral formulas, the geometric theory of pseudoconvexity, estimates, partial differential equations, approximation theory, the boundary behavior of holomorphic functions, inner functions, invariant metrics, and mapping theory. While due homage is paid to the more traditional algebraic theory (sheaves, Cousin problems, etc.), the student with a background in real and complex variable theory, harmonic analysis, and differential equations will be most comfortable with this treatment.

It is currently the only book on the subject with exercises and a large number of examples.

This item will also be of interest to those working in geometry and topology.

Contents: An introduction to the subject; Some integral formulas; Subharmonicity and its applications; Convexity; Hörmander’s solution of the $\Box_{\alpha}$ equation; Solution of the Levi problem and other applications of $\Box_{\alpha}$ techniques; Cousin problems, cohomology, and sheaves; The zero set of a holomorphic function; Some harmonic analysis; Constructive methods; Integral formulas for solutions to the $\Box_{\alpha}$ problem and norm estimates; Holomorphic mappings and invariant metrics; Manifolds; Area measures; Exterior algebra; Vectors, covectors, and differential forms; List of notation; Bibliography; Index.

AMS Chelsea Publishing

Analysis

Second Edition

Elliott H. Lieb, Princeton University, NJ, and Michael Loss, Georgia Institute of Technology, Atlanta

Praise for the previous edition ...

I find the selection of the material covered in the book very attractive and I recommend the book to anybody who wants to learn about classical as well as modern mathematical analysis.

—European Mathematical Society Newsletter

The essentials of modern analysis are presented in a rigorous and pedagogical way ... readers ... are guided to a level where they can read the current literature with understanding ... the treatment of the subject is as direct as possible.

—Zentralblatt für Mathematik
Lieb and Loss offer a practical presentation of real and functional analysis at the beginning graduate level ... could be used as a two-semester introduction to graduate analysis ... not all of the topics covered are typical. The authors introduce the subject with a thorough presentation ... [an] informative exposition.

—CHOICE

Significantly revised and expanded, this new Second Edition provides readers at all levels—from beginning students to practicing analysts—with the basic concepts and standard tools necessary to solve problems of analysis, and how to apply these concepts to research in a variety of areas.

Authors Elliott Lieb and Michael Loss take you quickly from basic topics to methods that work successfully in mathematics and its applications. While omitting many usual typical textbook topics, Analysis includes all necessary definitions, proofs, explanations, examples, and exercises to bring the reader to an advanced level of understanding with a minimum of fuss, and, at the same time, doing so in a rigorous and pedagogical way. Many topics that are useful and important, but usually left to advanced monographs, are presented in Analysis, and these give the beginner a sense that the subject is alive and growing.

This new Second Edition incorporates numerous changes since the publication of the original 1997 edition, and includes:

- a new chapter on eigenvalues that covers the min-max principle, semi-classical approximation, coherent states, Lieb-Thirring inequalities, and more
- extensive additions to chapters covering Sobolev Inequalities, including the Nash and Log Sobolev inequalities
- new material on Measure and Integration
- many new exercises
- and much more ...

The Second Edition continues its no-nonsense approach to the topic that has made it one of the best selling books on the subject. It is an authoritative, straight-forward volume that readers—from the graduate student, to the professional mathematician, to the physicist or engineer using analytical methods—will find useful both as a reference and as a guide to real problem solving.

About the authors: Elliott Lieb is Professor of Mathematics and Physics at Princeton University and is a member of the US, Austrian, and Danish Academies of Science. He is also the recipient of several prizes including the 1988 AMS/SIAM Birkhoff prize. Michael Loss is Professor of Mathematics at the Georgia Institute of Technology.

Contents: Measure and integration; $L^p$-spaces; Rearrangement inequalities; Integral inequalities; The Fourier transform; Distributions; The Sobolev spaces $H^1$ and $H^{1/2}$; Sobolev inequalities; Potential theory and Coulomb energies; Regularity of solutions of Poisson’s equation; Introduction to the calculus of variations; More about eigenvalues; References; List of symbols; Index.

Graduate Studies in Mathematics, Volume 14

Differential Equations

Ordinary Differential Equations
Second Edition
Stephen Salaff and Shing-Tung Yau
A publication of the International Press.

These articles arose from original lectures in differential equations given by the authors at Chung Chi College at the Chinese University of Hong Kong. This second edition makes this material available to a broader audience. Topics include: existence, uniqueness, and continuous dependence, continuation of solutions, the linear equation, power series solutions, linear systems with constant coefficients, autonomous systems, limit cycles, I, and limit cycles, II.

Distributed worldwide, except in Japan, by the American Mathematical Society.

International Press
December 2000, 72 pages, Softcover, ISBN 1-57146-065-9, 2000 Mathematics Subject Classification: 34-01, All AMS members $34$, List $42$, Order code INPR/35N

General and Interdisciplinary

Mikio Sato
A Great Japanese Mathematician of the Twentieth Century
Masaki Kashiwara, Kyoto University, Japan
Shing-Tung Yau, Harvard University, Cambridge, MA, and Takahiro Kawai, Kyoto University, Japan, Editors

A publication of the International Press.

This issue of the Asian Journal of Mathematics was dedicated to Professor Mikio Sato in the year of his seventieth birthday. Sato has made renowned mathematical contributions. His introduction of the sheaf of microfunctions opened a new era in analysis. His powerful collaborations with Kawai and Kashiwara led to the establishment of microlocal analysis, one of the most important discoveries in microfunctions and pseudo-differential equations. In this volume, leading researchers such as Yau, Schapira, Jacquet, Kashiwara, Melrose, and others, present their work in honor of Professor Sato.

Distributed worldwide, except in Japan, by the American Mathematical Society.
New Publications Offered by the AMS


International Press

December 2000, 1149 pages, Hardcover, ISBN 1-57146-081-0, 2000 Mathematics Subject Classification: 00B15, All AMS members $34, List $42, Order code INPR/38N

Sir Michael Atiyah
A Great Mathematician of the Twentieth Century
Shing-Tung Yau, Harvard University, Cambridge, MA, and Raymond H. Chan, Chinese University of Hong Kong, Hong Kong, Editors

A publication of the International Press.

This special issue of the Asian Journal of Mathematics was dedicated to Sir Michael Atiyah in the year of his seventieth birthday. Many distinguished researchers contributed articles to this volume in celebration of Atiyah’s profound contributions to topology, geometry, representation theory, and partial differential equations.

Distributed worldwide, except in Japan, by the American Mathematical Society.


International Press
December 2000, 332 pages, Hardcover, ISBN 1-57146-080-2, 2000 Mathematics Subject Classification: 00B15, All AMS members $34, List $42, Order code INPR/38N

Geometry and Topology

The Third Pacific Rim Geometry Conference
Jaigyoung Choe, Seoul
National University, Korea, Editor

A publication of the International Press.

This volume contains 20 papers from the proceedings of the third Pacific Rim Geometry Conference held at the Korea University (Seoul). Topics include the existence theorem of harmonic objects via the Green function, strings of Riemannian manifolds, inequalities, ideal immersions, and their applications, eigenvalue problems, Grassmann geometry and J-holomorphic curves of a 6-dimensional sphere, the structure of the image of analytic disks attached to totally real submanifolds, Mayer-Vietoris formula for determinants of elliptic operators of Laplace-Beltrami type, gauge-theoretic equations for harmonic maps into symmetric spaces, canonical flows of Einstein-Weyl manifolds, Jeffrey-Weitsman-Witten invariants of Seifert fibre manifolds, complex-analyticity of harmonic maps, and more.

This item will also be of interest to those working in analysis.

Distributed worldwide, except in Japan, by the American Mathematical Society.

Contents: S. Bando, The existence theorem of harmonic objects via Green function; B.-Y. Chen, Strings of Riemannian manifolds, inequalities, ideal immersions and their applications; R. Chen, On some eigenvalue problems; H. Hashimoto, Grassmann geometry and J-holomorphic curves of a 6-dimensional sphere; H. Kamada, Self-duality of neutral metrics on four-dimensional manifolds; I. Kim, Marked length spectrum on the finite set of elements determines the irreducible representation in the isometry group of rank one symmetric space of noncompact type; J. Kim, Compactification and construction of asymptotically Euclidean scalar-flat Kähler surfaces; K.-T. Kim, The Wu metric and minimum ellipsoids; D. Kwon and Y.-G. Oh, Structure of the image of analytic disks attached to totally real submanifolds; Y. Lee, Mayer-Vietoris formula for determinants of elliptic operators of Laplace-Beltrami type (after Burghela, Friedlander and Kappeler); K. Matsumoto, I. Mihai, and M. H. Shahid, Certain submanifolds of a Kenmotsu manifold; M. Mukai and Y. Ohnita, Gauge-theoretic equations for harmonic maps into symmetric spaces;
H. Naitoh, Grassmann geometries on compact symmetric spaces; Y. Nakagawa, Combinatorial formulae for Futaki characters and generalized K"{a}lling forms of toric Fano orbifolds; Y.-G. Oh, Naturality of Floer homology of open subsets in Lagrangian intersection theory; T. Okayasu, An extension of Chern-Lashof theorem to other space forms; S.-H. Paeng, Topological entropy for geodesic flows under Ricci curvature and conjugate radius bounded below; H. K. Fuk, Canonical flows of Einstein-Weyl manifolds; J. Park, Jeffrey-Weitsman-Witten invariants of Seifert fibred manifolds; K. Ueno, Complex-analyticity of harmonic maps.

International Press
December 2000, 333 pages, Hardcover, ISBN 1-57146-064-0, 2000 Mathematics Subject Classification. 53-XX, All AMS members $34, List $42, Order code INPR/34N

Groups of Homotopy Self-Equivalences and Related Topics
Ken-ichi Maruyama, Chiba University, Japan, and John W. Rutter, University of Liverpool, England, Editors

This volume offers the proceedings from the workshop held at the Gargnano Institute of the University of Milan (Italy) on groups of homotopy self-equivalences and related topics. The book comprises articles of current research on the group of homotopy self-equivalences, the homotopy of function spaces, rational homotopy theory, the classification of homotopy types, and equivariant homotopy theory.

Mathematicians from many areas of the globe attended the workshops to discuss their research and to share ideas. Included are two specially-written articles, by J. W. Rutter, reviewing the work done in the area of homotopy self-equivalences since 1988. Included also is a bibliography of some 122 articles published since 1988 and a list of problems. This book is suitable for both advanced graduate students and researchers.

Contents: J. W. Rutter, Homotopy self-equivalences 1988–1999; J. W. Rutter, Bibliography on $\mathcal{E}(X)$ 1988–1999; M. Arkowitz, G. Lupton, and A. Murillo, Subgroups of the group of self-homotopy equivalences; S. Bauer, M. Crabb, and M. Spreafico, The space of free loops on a real projective space; H.-J. Baues and Y. Drozd, Indecomposable homotopy types with at most two non-trivial homology groups; H.-J. Baues and N. Iwase, Square rings associated to elements in homotopy groups of spheres; P. L. Booth, Fibrations with product of Eilenberg-MacLane space fibres I; D. L. Ferrario, Self homotopy equivalences of equivariant spheres; Y. Felix, Two examples to illustrate properties of the group of self-equivalences of a finite CW complex $X$; A. Garvin, A. Murillo, P. Pavesic, and A. Viruel, Nilpotency and localization of groups of fibre homotopy equivalences; K. A. Hardie and K. H. Kamps, The homotopy groups of the homotopy fibre of an induced map of function spaces; V. Hauschild, Fibrations, self homotopy equivalences and negative derivations; K. Ishiguro, Classifying spaces and a subgroup of the exceptional Lie group $G_2$; D. Kahn and C. Schwartz, The structure of the Hurewicz homomorphism; H. J. Marcum, Joins, diagonals and Hopf invariants; K.-i. Maruyama, A subgroup of self homotopy equivalences which is invariant on genus; K. Morisugi, Composition structure of the self maps of $SU(3)$ or $Sp(2)$; J. Mukai, Self-homotopy of a suspension of the real 4-projective space; J. Pan and M. H. Woo, Phantom elements and its applications; J. W. Rutter, Homotopy equivalences of lens spaces of one-relator groups; H. Shiga, K. Tsukiyama, and T. Yamaguchi, Principal $S^1$-bundles and forgetful maps; S. B. Smith, Rational type of classifying spaces for fibrations; M. Arkowitz, Problems on self-homotopy equivalences.

Contemporary Mathematics, Volume 274

Geometry of Characteristic Classes
Shigeyuki Morita, Tokyo Institute of Technology, Japan

Characteristic classes are central to the modern study of the topology and geometry of manifolds. They were first introduced in topology, where, for instance, they could be used to define obstructions to the existence of certain fiber bundles. Characteristic classes were later defined (via the Chern-Weil theory) using connections on vector bundles, thus revealing their geometric side.

In the late 1960s new theories arose that described still finer structures. Examples of the so-called secondary characteristic classes came from Chern-Simons invariants, Gelfand-Fuks cohomology, and the characteristic classes of flat bundles. The new techniques are particularly useful for the study of fiber bundles whose structure groups are not finite dimensional.

The theory of characteristic classes of surface bundles is perhaps the most developed. Here the special geometry of surfaces allows one to connect this theory to the theory of moduli space of Riemann surfaces, i.e., Teichmüller theory. This book Morita presents an introduction to the modern theories of characteristic classes.

This item will also be of interest to those working in algebra and algebraic geometry.

Contents: De Rham homotopy theory; Characteristic classes of flat bundles; Characteristic classes of foliations; Characteristic classes of surface bundles; Directions and problems for future research; Bibliography; Index.

Translations of Mathematical Monographs (Iwanami Series in Modern Mathematics), Volume 199
May 2001, 180 pages, Softcover, ISBN 0-8218-2139-3, LC 00-054312, 2000 Mathematics Subject Classification. 54C40, 14E20; 46E25, 20C20, All AMS members $24, List $30, Order code MMONO/199N
Simplicial and Operad Methods in Algebraic Topology
V. A. Smirnov, Moscow State Pedagogical Institute, Russia

In recent years, for solving problems of algebraic topology and, in particular, difficult problems of homotopy theory, algebraic structures more complicated than just a topological monoid, an algebra, a coalgebra, etc., have been used more and more often. A convenient language for describing various structures arising naturally on topological spaces and on their cohomology and homotopy groups is the language of operads and algebras over an operad. This language was proposed by J. P. May in the 1970s to describe the structures on various loop spaces.

This book presents a detailed study of the concept of an operad in the categories of topological spaces and of chain complexes. The notions of an algebra and a coalgebra over an operad are introduced, and their properties are investigated. The algebraic structure of the singular chain complex of a topological space is explained, and it is shown how the problem of homotopy classification of topological spaces can be solved using this structure. For algebras and coalgebras over operads, standard constructions are defined, particularly the bar and cobar constructions. Operad methods are applied to computing the homology of iterated loop spaces, investigating the algebraic structure of generalized cohomology theories, describing cohomology of groups and algebras, computing differential in the Adams spectral sequence for the homotopy groups of the spheres, and some other problems.

Contents: Operads in the category of topological spaces; Simplicial objects and homotopy theory; Algebraic structures on chain complexes; $A_n$-structures on chain complexes; Operads and algebras over operads; Homology of iterated loop spaces; Homotopy theories and $E_n$-structures; Operad methods in cobordism theory; Description of the cohomology of groups and algebras; Homology operations and differentials in the Adams spectral sequence; Bibliography; Index.

Translations of Mathematical Monographs, Volume 198

Mathematical Physics

Bosonic Strings: A Mathematical Treatment
Jürgen Jost, Max Planck Institute for Mathematics in the Sciences, Leipzig, Germany

Presented in this book is a mathematical treatment of Bosonic string theory from the point of view of global geometry. As motivation, the author presents the theory of point particles and Feynman path integrals. He considers the theory of strings as a quantization of the classical Plateau problem for minimal surfaces. The conformal variance of the relevant functional, the Polyakov action or (in mathematical terminology) the Dirichlet integral, leads to an anomaly in the process of quantization. The mathematical concepts needed to resolve this anomaly via the Faddeev-Popov method are introduced, specifically the geometry of the Teichmüller and moduli spaces of Riemann surfaces and the corresponding function spaces, i.e., Hilbert spaces of Sobolev type and diffeomorphism groups. Other useful tools are the algebraic geometry of Riemann surfaces and infinite-dimensional determinants. Also discussed are the boundary regularity questions. The main result is a presentation of the string partition function as an integral over a moduli space of Riemann surfaces. Some new physical concepts, such as D-branes, are also discussed.

This volume offers a mathematically rigorous treatment of some aspects of string theory, employs a global geometry approach, systematically treats strings with boundary, and carefully explains all mathematical concepts and tools.

Titles in this series are copublished with International Press, Cambridge, MA.

Contents: Point particles; The Bosonic string; Bibliography; Index.

AMS/IP Studies in Advanced Mathematics

Individual member $31$, List $39$, Order code AMSIP-JOST1N
Previously Announced Publications

Partial Differential Equations in Several Complex Variables
So-Chin Chen, National Tsing-Hua University, Hsinchu, Taiwan, and Mei-Chi Shaw, University of Notre Dame, IN

In the last few decades, significant progress was made in the study of Cauchy-Riemann and tangential Cauchy-Riemann operators; this progress greatly influenced the development of PDEs and several complex variables. After the background material in complex analysis is developed in Chapters 1 through 3, the next three chapters are devoted to the solvability and regularity of the Cauchy-Riemann equations using Hilbert space techniques. The second part of the book gives a comprehensive study of the tangential Cauchy-Riemann equations, another important class of equations in several complex variables first studied by Lewy. An up-to-date account of the $L^2$ theory for $\partial_b$ operator is given. This fairly self-contained book provides a much-needed introductory text to several complex variables and PDEs. It also provides a rich source of information to experts. Titles in this series are copublished with International Press, Cambridge, MA.

AMS/IP Studies in Advanced Mathematics, Volume 19

Operator Theoretical Methods
A. Gheondea, R. N. Gologan, and D. Timotin, Romanian Academy, Bucharest, Romania, Editors

A publication of the Theta Foundation.
This volume contains carefully selected contributions by participants at the Seventeenth International Conference on Operator Theory held at the University of Timișoara (Romania). A large variety of topics are covered, including single operator theory, C*-algebras, spectral theory, special classes of concrete operators, and holomorphic operator functions.

Distributed worldwide, except in Romania, by the AMS.
International Book Series of Mathematical Texts

Laminations and Foliations in Dynamics, Geometry and Topology
Mikhail Lyubich, John W. Milnor, and Yair N. Minsky, SUNY at Stony Brook, NY, Editors

This volume is based on a conference held at SUNY, Stony Brook (NY). The concepts of laminations and foliations appear in a diverse number of fields, such as topology, geometry, analytic differential equations, holomorphic dynamics, and renormalization theory. Although these areas have developed deep relations, each has developed distinct research fields with little interaction among practitioners.

Of particular interest are the articles by F. Bonahon, “Geodesic Laminations on Surfaces”, and D. Gabai, “Three Lectures on Foliations and Laminations on 3-manifolds”, which are based on minicourses that took place during the conference.

Contemporary Mathematics, Volume 269

Algebraic Geometry 2
Sheaves and Cohomology
Kenji Ueno, Kyoto University, Japan

Modern algebraic geometry is built upon two fundamental notions: schemes and sheaves. The theory of schemes was explained in Algebraic Geometry 1: From Algebraic Varieties to Schemes (see Volume 185 in the same series, Translations of Mathematical Monographs). In the present book, Ueno turns to the theory of sheaves and their cohomology. Loosely speaking, a sheaf is a way of keeping track of local information defined on a topological space, such as the local holomorphic functions on a complex manifold or the local sections of a vector bundle. To study schemes, it is useful to study the sheaves defined on them, especially the coherent and quasicoherent sheaves. The primary tool in understanding sheaves is cohomology. For example, in studying ampleness, it is frequently useful to translate a property of sheaves into a statement about its cohomology.

The text covers the important topics of sheaf theory, including types of sheaves and the fundamental operations on them, such as coherent and quasicoherent sheaves, proper and projective morphisms, direct and inverse images, and sheaves. The primary tool in understanding sheaves is cohomology. For example, in studying ampleness, it is frequently useful to translate a property of sheaves into a statement about its cohomology.

The text covers the important topics of sheaf theory, including types of sheaves and the fundamental operations on them, such as coherent and quasicoherent sheaves, proper and projective morphisms, direct and inverse images, and sheaves. The primary tool in understanding sheaves is cohomology. For example, in studying ampleness, it is frequently useful to translate a property of sheaves into a statement about its cohomology.

The book contains numerous problems and exercises with useful hints. It would be an excellent text for the second part of a course in algebraic geometry.

Translations of Mathematical Monographs (Iwanami Series in Modern Mathematics), Volume 197