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BULLETIN OF THE INTERNATIONAL MATHEMATICAL UNION

REPORT OF THE EXECUTIVE COMMITTEE OF THE INTERNATIONAL MATHEMATICAL UNION TO THE NATIONAL ADHERING ORGANIZATIONS

1 January — 31 December 1968

A. Membership.

The following 41 countries were members of the Union in 1968:

Group I: Argentina, Brazil, Bulgaria, China-Taiwan, Cuba, Greece, East Germany, Iceland, Ireland, Malaya-Singapore, Mexico, North Korea, Norway, Portugal, South Africa, Turkey;

Group II: Australia, Austria, Denmark, Finland, Israel, Pakistan, Rumania, Spain, Sweden, Yugoslavia;

Group III: Belgium, Canada, Czechoslovakia, Hungary, India, the Netherlands, Switzerland.

Group IV: France, Germany, Italy, Japan, Poland;

Group V: Great Britain, U.S.A., U.S.S.R.

This membership corresponded to a total voting strength of 92 and an annual income from membership dues of $ 10.366.80 (equivalent to 106 untis).

B. Scientific Activities.

I. Colloquia and Symposia.

The following research colloquia were co-sponsored by the Union in 1968:

(i) *International Colloquium on Algebraic Geometry in Bombay, January 16—23, 1968.*

An Organizing Committee consisting of Professor K. G. Ramanathan (Chairman), Professors M. S. Narasimhan, C. S. Seshadri, C. P. Ramanujam, M. F. Atiyah and A. Grothendieck was in charge of the scientific programme. Professors Atiyah and Grothendieck acted as representatives of the International Mathematical Union on the Organizing Committee. The purpose of the Colloquium was to discuss recent developments in some aspects of

(i) singularities of algebraic varieties and abstract algebraic geometry,
(ii) the moduli problem and related questions, and
(iii) arithmetical algebraic geometry and algebraic groups.

The colloquium was jointly sponsored and financially supported by the International Mathematical Union, the Sir Dorabji Tata Trust and the Tata Institute of Fundamental Research. Besides, several governmental and non-governmental agencies like the National Science Foundation (USA), the Sloan Foundation (USA), the Royal Society of London, The Cambridge University (England), the Department of Cultural Affairs of the French Government and the Deutsche Forschungsgemeinschaft in Germany, contributed substantial travel grants to enable mathematicians from their respective countries to participate in the Colloquium.

The Colloquium, as in the past, was a closed meeting of experts and of others seriously interested in Algebraic Geometry. It was attended by 26 members, and 32 other participants, from France, Germany, India, Japan, the Netherlands, U.K., U.S.A. and U.S.S.R.

For the detailed scientific programme, see Appendix A.

(ii) *Conference on Transformation Groups at Plans-sur-Bex, March 18—28, 1968.*

Professor E. Vesentini, the International Mathematical Union's representative on the Organizing Committee, has given the following report:

„The Conference was attended by 23 young mathematicians, all coming from Swiss universities, with the exception of Mr. Tierny, from Columbia University, temporary member of the Forschungsinstitut für Mathematik in Zürich and Mr. Guenot from the University of Nice.

At the meeting were also invited the following experts:

J. C. Koszul, University of Grenoble,
R. Narasimhan, Universtiy of Genève,
R. Sridharan, Tata Institute of Fundamental Research, Bombay and Forschungsinstitut für Mathematik, Zürich,
E. Vesentini, Scuola Normale Superiore, Pisa.

All the lectures but one were delivered by the young mathematicians while the experts were asked to cooperate in the preparation and coordination of the exposés. This procedure — which differs essentially from that followed in most Colloquia and Summer courses of this kind — has worked extremely well. The audience participated actively, and most of the lectures were followed by lively discussions.

Initially the meeting was planned to discuss some aspects of the theory of transformation groups. Later on its purpose was considerably enlarged in order to give a fairly complete survey of the subjects which are currently cultivated in the departments of pure mathematics of the Swiss universities. Accordingly all the nineteen lectures — with the exception of three of them — did not contain any original result but were aimed at giving a fairly complete exposition of some chapters of modern mathematics, starting from an elementary level. The mimeographed notes of seven of them were made available during the meeting. The text of four lectures will appear soon.

The topics covered in the meeting were the following:
—functional analysis and group representations;
—compactification of topological groups;
—characteristic classes and K-theory;
—complex spaces and homogeneous almost complex manifolds;
—classification of semi-simple Lie algebras.

It turned out that these topics were too far apart from each other, and that the schedule was too heavy, leaving a rather short time for the general discussions.

However the meeting was a major success, not only from the point of view of mathematics, but also for the warm, friendly atmosphere which developed among all the participants. That was due in large part to the great care which was put in planning and organizing all the details of the meeting. The credit for it goes to R. Narasimhan, A. Amiguet and his father A. Amiguet who was in charge of all the practical arrangements connected with our staying at the „Chalet pro Juventute" at Plans-sur-Bex.

In conclusion I should like to reccomend that in the future similar conferences be encouraged and sponsored by IMU in Switzerland and elsewhere".

(iii) *Symposium on Construction of Models for Axiomatic Theories in Warsaw, August 27 — September 1, 1968.*

The Symposium was organized by the Institute of Mathematics, Polish Academy of Sciences and co-sponsored by the Division of Logic, Methodology and Philosophy of Sciences of the International Union of History and Philosophy of Sciences and by the International Mathematical Union. There were 55 participants from 13 countries.

For the detailed scientific programme, see Appendix B.

(iv) *Third Nordic Summer School in Mathematics (Algebraic Topology) in Aarhus, June 16 — July 8, 1968.*

The School was attended by 37 participants from the Nordic countries and by 31 associated participants: staff members, guests, and advanced students at the Mathematics Institute, University of Aarhus.

The program included the following series of lectures:

D. W. Anderson (M. I. T.): K-Theory (12)
A. Dold (Universität Heidelberg): General Cohomology (12)
L. Kristensen (University of Aarhus): Homotopy Theory (6)
A. Liulevicius (University of Chicago): Characteristic Classes (12)
C. R. F. Maunder (University of Cambridge): Further on Homotopy (12)
E. C. Zeeman (University of Warwick): Dynamic Systems (6).

The figures in brackets indicate the number of lectures.

During the session first versions of lecture notes written by the lecturers were produced. Afterwards a group of participants assisted the authors in producing final versions which are now available as stencilled books. Furthermore the secretariat of the Summer School made copies (one copy for each participant) of a substantial amount of relevant research papers.

All activities including informal discussions of the Summer School took place at the Mathematics Institute. Each participant disposed of office space. All meals were served in the institute cafeteria, where also social gatherings on Saturday were arranged.

Economically the Summer School was based on grants of 95.000 Danish Kronor from the Nordic Cultural Foundation and 1.500 US $ from the International Mathematical Union.

The first announcement of the Summer School (conditional on the necessary grants) was issued on the 13th December, 1967. It contained a list of literature indicating the level of knowledge that participants were expected to have reached. In fact it turned out that all participants were well prepared upon their arrival.

The scientific and practical arrangement of the Summer School rested with the Mathematics Institute, University of Aarhus.

(v) *International Symposium on Topology and its Applications at Herceg Novi, August 25—31, 1968.*

The Symposium was organized by the Union of Mathematicians of Yugoslavia, and the International Mathematical Union contributed to the travel expenses of some pre-assigned speakers. There were 93 participants from 17 countries. Czechoslovakians, Greeks and Rumanians were not present but sent their contributed papers.

(vi) *International Colloquium on Mathematical Logic and Foundations of Set Theory in Jerusalem, November 11 — 14, 1968.*

The Colloquium was organized by The Israel Academy of Sciences and Humanities and by The Mathematical Institute of the Hebrew University of Jerusalem on behalf of the International Mathematical Union. There were 9 speakers invited, among them 3 from the U.S.A., 3 from Israel, 1 from England, 1 from West Germany and 1 from Switzerland. In addition, 10—15 Israeli scholars and graduate students participated in the various meetings. In conjunction with the Colloquium, a public meeting was held in commemoration of the late Professor A. H. Fraenkel with Professor A. Tarski as the main speaker, and Professor Y. Bar-Hillel presenting an appreciation of Professor Fraenkel's contribution to the Philosophy of Mathematics.

For the detailed programme, see Appendix C.

(vii) *Latin American School of Mathematics (Analysis) in Rio de Janeiro, July 1—26, 1968.*

The School was held at the Instituto de Matemática Pura e Aplicada, Rio de Janeiro, July 1—26, 1968. It was at research/postdoctoral level, and the invited lecturers were Professors L. Schwartz (Paris), F. Trèves (Purdue) and R. Seeley (Brandeis). The School was financially supported by the National Research Council of Brazil, by the Foundation for Support to Research of Brazil, by the Ministry of Foreign Affairs of Brazil, by the Organization of American States and by the USA National Science Foundation.

By authorization of the Executive Committee, the President and the Secretary of IMU decided to give financial support to the printing of the lecture notes by Trèves and Seeley. They deal respectively with the Cauchy problem and singular integrals as applied to elliptic operators.

II. Exchange Programme — IMU Lectureships.

During 1968 the following visits were partially financed by the IMU: Professor *P. S. Alexandrov* (U.S.S.R.) to the Netherlands, Professor *N. H. Kuiper* (the Netherlands) to Poland and Professors *M. F. Atiyah* (U.K.) and *R. H. Bott* (U.S.A.) to Sweden.

III. International Commission on Mathematical Instruction (ICMI).

(i) The German Democratic Republic was admitted as Subcommission of ICMI from January 1, 1969. From the same date, Tunisia was admitted as special Subcommission of ICMI.

(ii) The President participated in a Congress on the Integration of Science Teaching at Varna, Bulgaria, September 11—19, 1968. The Congress was sponsored by IUCST with the assistance of UNESCO.

(iii) The President sent a report on Mathematical Olympiads to the National Subcommissions.

(iv) A new pedagogical journal „Educational Studies in Mathematics" has been issued with the President, Professor H. Freudenthal, as editor. It is published by D. Reidel Pub. Co., Dordrecht-Holland, and the first number appeared in May 1968.

(v) It has been announced that the First International Congress on Mathematical Education will be held in Lyon, August 24—30, 1969. In connection with the Congress a meeting of ICMI will take place.

C. Meetings of the Executive Committee.

The 24th meeting of the Executive Committee was held in Paris, May 6—7, 1968 and was attended by Professor H. Cartan (President), Professor G. de Rham (Past President), Professors M. Lavrentiev and D. Montgomery (Vice-Presidents), Professor O. Frostman (Secretary), Professors Atiyah, Chandrasekharan, Hajós and Vesentini (Members). Professor K. Yosida could not attend the meeting. In his place Professor S. Iyanaga attended the meeting at the discussion of the Tokyo Conference in 1969.

(i) The audited financial statement for 1967 was adopted.

(ii) In addition to allocations already made the Executive Committee decided to support the Nordic Summer School in Mathematics (Algebraic Topology) at Aarhus (June—July 1968) and the Symposium on „Topology and its Applications" at Herceg Novi (August 1968). It was reported that the „Conference on Transformation Groups" at Plans-sur-Bex had been very successful; allocation for this Conference had been obtained by postal ballot.

(iii) The Secretary would write to the national members, inviting them to apply for subventions to scientific activities during the latter half of the year, and the President and the Secretary were authorized to take decisions within the limits of the budget for 1968.

(iv) In order to emphasize the importance attached by the Union to such a regional congress as the „International Conference on Functional Analysis and Related Topics" in Tokyo, April 1969, the President was urged to attend at the conference.

(v) Professor S. Hitotumatu was appointed IMU's representative on COSPAR at the Plenary Meeting in Tokyo. Professor G. de Rham agreed to be IMU's representative on ICSU for one year more.

(vi) The relations between IMU, ICMI and „L'Enseignement mathématique" were discussed. It was agreed that a 4th edition of the „World Directory of Mathematicians" should be issued, and arrangements for the publication were discussed.

(vii) A list for the Fields Committee was approved.

D. Financial Report.

The Financial Report for 1968 has been presented separately.

APPENDIX A

International Colloquium on Algebraic Geometry

S. Abhyankar (U.S.A.): Resolution of singularities of algebraic surfaces.
M. Artin (U.S.A.): The implicit function theorem in algebraic geometry.
A. Borel (U.S.A.): Automorphisms of certain subgroups of algebraic groups.
B. J. Birch (England): Arithmetic applications of modular functions.
J. W. S. Cassels (England): Rational points on curves of higher genus.
B. M. Dwork (U.S.A.): A deformation theory for singular hypersurfaces.
P. A. Griffiths (U.S.A.): Some remarks on algebraic cycles and complex tori.
A. Groethendieck (France): Standard conjectures on algebraic cycles.
F. Hirzebruch (West Germany): Singularities, spheres and group actions.
J. I. Igusa (U.S.A.): Geometric and analytic methods in the theory of theta functions.

Yu. I. Manin (U.S.S.R): On some groups related to cubic hypersurfaces.
D. Mumford (U.S.A.): All abelian varieties can be lifted to characteristic zero.
T. Matsusaka (U.S.A.): Some results on universal families of deformations.
M. Nagata (Japan): Some questions on rational actions of groups.
M. S. Narasimhan (India) and S. Ramanan (India): Moduli of vector bundles on a complete algebraic curve.
C. S. Seshadri (India): Mumford's conjecture for GL(2) and applications.
T. A. Springer (The Netherlands): Unipotent elements in semi-simple groups.
J. L. Verdier (France): Base change theorem for the twisted inverse image of coherent sheaves.
A. Weil (U.S.A.): Zeta functions and Mellin transforms.

APPENDIX B

Construction of Models for Axiomatic Theories

A. Daigneault (Canada): Lawvere's elementary theories and polyadic and cylindric algebras.
F. Drake (Great Britain): Some results in generic extensions.
J. L. Eršov (U.S.S.R.): Constructive models.
A. Hajnal (Hungary): Combinatorial problems involving large cardinals.

M. Makai (Hungary): Derivation free proofs of model theoretic results for denumerably long sentences with finite strings of quantifiers.
A. B. Taymanov (U.S.S.R.): Problems connected with algorithmic questions of number theory.

These speakers delivered one-hour addresses. Besides, there were 8 meetings with 28 short communications.

APPENDIX C

International Colloquium on Mathematical Logic and Foundations of Set Theory

H. Gaifman (Israel): New developments in non-standard models for Peano's arithmetic.
R. B. Jensen (West Germany): Remarks on Souslin's hypothesis.
H. Läuchli (Switzerland): An abstract notion of realizability for which intuitionistic predicate calculus is complete.
A. Levy (Israel): The independence of the continuum hypothesis of a Borel decomposition theorem.
Y. N. Moschovakis (U.S.A.): Structure in the projective hierarchy.
M. Rabin (Israel): Definability in weak second-order logic.
R. Solovay (U.S.A.): A non-constructible $\triangle^1_3$ set of integers: consistency results.
M. Yates (England): Initial segments of the degrees below $O^{(i)}$.

End of the Bulletin of the International Mathematical Union.