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

1 January — 31 December 1969

**A. Membership.**

The following 42 countries were members of the Union in 1969:

- Group I: Argentina, Brazil, Bulgaria, China-Taiwan, Cuba, East Germany, Greece, Iceland, Ireland, Malaya-Singapore, Mexico, New Zealand, 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 93 and an annual income from membership dues of \$ 10.464.60 (equivalent to 107 units).

**B. Scientific Activities.**

**I. Colloquia and Symposia:**

The following research colloquia were co-sponsored by the Union in 1969:

(i) *International Conference on Functional Analysis and Related Topics in Tokyo, April 1—8, 1969.*

The Conference was organized by the Mathematical Society of Japan and co-sponsored by the International Mathematical Union and the Science Council of Japan. Professor K. Yosida acted as Chairman of the Organizing Committee and the IMU representatives on this Committee were Professors M. F. Atiyah, J.-L. Lions and R. S. Phillips.

Already in 1966 the Japanese delegates to the General Assembly of IMU at Dubna expressed a desire to have in the spring of 1969 some new kind of congress sponsored by IMU, smaller than the usual one but larger than an ordinary symposium and centering around certain specific (two or three) fields of mathematics, combined with a symposium on mathematical education. Later this programme was reduced, but the Executive Committee of IMU strongly supported the idea of a regional congress in Japan with participation of a great number of mathematicians from Asia, Australia and Oceania who normally don't have the opportunity to attend at international meetings. In that case the Union was willing to contribute financially not only to the travel expenses of invited speakers but also to those of other qualified participants from the area mentioned above. Thus, as a result of these agreements, travel expenses amounting to \$ 4.000 were paid by IMU to mathematicians from Australia, Hong Kong, India, Korea, New Zealand, Singapore and Vietnam, whereas the living expenses were paid by the Organizing Committee. The Organizing Committee appealed to the neighboring 16 countries and selected 7 mathematicians of the aforementioned countries out of 18 candidates from 9 countries. The total contribution of IMU amounted to \$ 9.700 and the total cost of the Conference is estimated to about \$ 50.000.

In order to emphasize the importance attached by IMU to this type of meetings the President of IMU, Professor H. Cartan, attended at the Conference and gave address at the Opening Ceremony.

The numbers of participants from different countries were as follows: Australia 1, Belgium 1, Canada 3, Denmark 1, France 4, Germany 1, Hong Kong 1, India 3, Israel 1, Italy 1, Japan 292, Korea 2, New Zealand 1, Rumania 1, Singapore 1, Sweden 1, U. K. 1, U. S. A. 12, U. S. S. R. 5, Vietnam 2, in all 335.

For the detailed scientific programme, see *Appendix A*.

(ii) *Mathematical Conference at Plans-sur-Bex, March 17—23, 1969.*

The second meeting at Plans-sur-Bex was attended by 29 young mathematicians; 22 of them came from Swiss universities, 6 from France and 1 from Italy.

At the meeting were invited as experts:

W. H. Greub, University of Toronto, Canada, and University of Fribourg, Switzerland;

E. Vesentini, Scuola Normale Superiore, Pisa, Italy.

The topics covered were the following:

Cohomology of Lie groups and Lie algebras;

Spherical functions;

Locally compact groups.

The lectures were all aimed at giving a fairly complete exposition of the current status of research in the above topics, starting from an elementary level.

A comparison with last year's programme shows that the field covered in this meeting has been considerably reduced. That has been done on purpose, in order to concentrate the attention of the audience on topics rather close to each other.

The IMU representative, Professor E. Vesentini, reports that the result has been essentially positive and he recommends that further meetings at Plans-sur-Bex be encouraged and sponsored by IMU. However, in order to enlarge as far as possible the general interest and to facilitate the participation of new people, the next meeting should be devoted to an entirely different topic.

(iii) *Fourth Nordic Summer School of Mathematics (Pseudodifferential operators with applications to index problems)*, Tyft outside Göteborg, June 15—July 5, 1969.

The programme included the following series of lectures (the number of lectures is given in brackets):

M. Atiyah, Oxford: General index theory (6)

L. Boutet de Monvel, Alger: Boundary problems for pseudo-differential operators (8)

L. Hörmander, Lund: Fourier integral operators (8)

G. Segal, Oxford: K-theory (6)

I. M. Singer, Boston: Fredholm operators, families of elliptic operators, the generalized Bott periodicity theorem (6)

Further lectures were given by L. Gårding, Lund, on hyperbolic differential operators and P. Lax, New York, on symmetrization. 15 participants gave seminar talks.

From Scandinavian countries 23 participants were attending (Denmark 8, Finland 1, Iceland 1, Norway 4, Sweden 9). A grant from the International Mathematical Union made it possible to accept 11 more participants (Canada 2, England 1, Italy 4, Poland 3, U. S. A. 1).

All activities took place at „Billströmska folkhögskolan” on the island of Tjörn in south-western Sweden. Staff members and participants were all lodged in the dormitories of that school and had their meals there.

The first communication about the Summer School was issued on December 13, 1968, and sent to all Nordic universities and some foreign mathematical societies. It contained a list of the literature the participants should have studied before coming to the school and an application form to be sent in before February 5, 1969. All who applied in time were accepted, and received further communications issued on May 2 and June 1.

Economically the Summer School was made possible by a grant of 90.000 Danish crowns from the Nordic Cultural Commission and the IMU contribution of U. S. \$ 2.000.

(iv) *Royal Irish Academy Summer School on Group Representations and Quantum Theory at Trinity College, Dublin, July 7—18, 1969.*

This was the first major mathematical summer school to be held under the auspices of the Royal Irish Academy. The following courses of lectures were given (the number of lectures in each course is given in brackets).

Dr. F. Holland (Cork): Spectral theory in Hilbert spaces (3).

Dr. D. J. Simms (Dublin): Lie groups and Lie algebras (4).

Dr. D. J. H. Garling (Cambridge): Representations of locally compact groups (8).

Prof. L. O’Raifeartaigh (Dublin Institute): Unitary representation of Lie groups in quantum theory (8).

Dr. J. T. Lewis (Oxford): Induced representations of the rotation and Euclidean groups (5).

Dr. P. Winternitz (Rutherford Lab.): The Poincaré group, its little groups and their applications in particle physics (5).

The total number of participants was 98 of which the distribution was Great Britain 44, Ireland 38, France 5, Italy 4, Czechoslovakia 2, U.S.A. 2, Belgium 1, Germany 1, Canada 1.

The International Mathematical Union paid the travel expenses of Dr. Garling from Cambridge and Dr. Lewis and Dr. Winternitz from Oxford.

## II. Exchange Programme—IMU Lectureships.

Under the Exchange Programme travel grants were paid to Professor *P. R. Halmos* (U.S.A.) for a visit to Brazil and to Professor *Y. Komura* (Japan) for a visit to Poland.

Professor *Halmos* gave a post-doctoral course at the 7th Brazilian Colloquium of Mathematics held at Pocos de Caldas, Brazil, July 6—26, 1969. Professor *Komura* gave a series of lectures and seminars at the Institute of Mathematics of the Polish Academy of Sciences and participated in the Colloquium on „Nuclear spaces and ideals in operator algebras” in Warsaw, June 18—25, 1969.

## III. International Commission on Mathematical Instruction (ICMI).

(i) In 1969 the Executive Committee of ICMI was unchanged. ICMI meetings took place at the Lyon Congress.

(ii) A regional Colloquium on „Le passage de l'école secondaire à l'université” was organized in Echternach, Luxembourg, May 28—31, 1969.

(iii) The main activity of ICMI in 1969 was to prepare the First International Congress of Mathematical Education in Lyon, August 24—30, 1969. The Congress, attended by about 655 active participants, was a big success thanks to the high level of the 21 addresses delivered by outstanding educators, a large number of panel discussions and free communications, and thanks to the excellent organization. The Congress adopted the following resolutions:

1. In all countries, the modernization of the teaching of mathematics should be pursued as vigorously as possible, both in the content of syllabuses and in the manner of presentation. Content and methods are inseparable, and should be kept continually under scrutiny.
2. Mathematical ideas are inherent in many other disciplines (physics, biology, economics, sociology, . . .). Much mathematics arises from the construction of mathematical models of real situations, and the teaching of mathematics must recognize this. Collaboration between teachers of mathematics and those of other disciplines should therefore be encouraged.
3. International cooperation should be further developed. Information on the teaching of mathematics can be exchanged at conferences, in publications, and by visiting lecturers. Each country should be more fully informed of activities in the other countries. In particular, the „advanced” countries should continue to collaborate with the developing countries, in the search for solutions appropriate to them.
4. The rapid development of the content and methods of mathematical education makes it necessary for the teacher of mathematics to be given opportunities to pursue further professional study during his employment.
5. The theory of mathematical education is becoming a science in its own right, with its own problems both of mathematical and pedagogical content. The new science should be given a place in the mathematical departments of Universities or Research Institutes, with appropriate academic qualifications available.

The Congress also made the following recommendations to ICMI:

1. To study the problems of international information on mathematical education in the various countries, in particular that of the establishment of international information centers and that of the creation of an information bulletin.

2. As regards the form of the next congress; to pay more attention to pre-school education, elementary education, mathematical education for the whole of the young people, adult education.

The Proceedings of the Congress will soon be published. The next International Congress on Mathematical Education is scheduled to be held in 1972.

- (iv) The report on Mathematical Contests in Secondary Education (Olympiads) has been finished and published. A second volume of „New Trends in Mathematical Education” is finished and will soon be published. The first issue of „Zentralblatt für Didaktik der Mathematik“, sponsored by ICMI, has appeared.
- (v) The President of ICMI attended a Conference on Teaching Probability, organized by CEMREL in Carbondale, Illinois, U. S. A., March 18—27, 1969. He also attended the International Olympiad in Bucharest, July 7—20, as a member of the delegation from the Netherlands. He took an active part in the work of the IUCST.

### C. Meetings of the Executive Committee.

The 25th meeting of the Executive Committee was held in Pisa, May 16—17, 1969 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.

- (i) The audited financial statement for 1968 printed in „International Mathematical News” (Nr. 92, May 1969), was circulated and approved.
- (ii) A draft report to the National Adhering Organizations, prepared by the Secretary, had been circulated on the members of the Executive Committee. Some cancellations made, the report was adopted.
- (iii) The Secretary reported on the allocations in 1968 decided by the President and the Secretary by authorization of the Executive Committee: (1) Printing of lectures given by Seeley and Trèves in Rio de Janeiro, July 1968; (2) International Colloquium on „Mathematical logic and foundations of set theory” in Jerusalem, November 11—14, 1968.
- (iv) Professor Vesentini reported on the Mathematical Conference at Plans-sur-Bex, March 17—23, 1969; the President and Professor Atiyah reported on the International Conference on „Functional analysis and related topics” in Tokyo, April 1—8, 1969 (see above).
- (v) In addition to allocations already made, the Executive Committee decided to support the Nordic Summer School in Mathematics in Gothenburg, Sweden, June—July 1969 and the Royal Irish Academy Summer School in Dublin, July 1969 (see above).
- (vi) Decision was taken as to the allocation to the International Congress of Mathematicians in Nice 1970. The work of the Consultative Committee was discussed; means were allocated to a second meeting of this Committee. A Committee was nominated to decide on the place for the International Congress in 1974.
- (vii) The Executive Committee accepted an offer by Messrs. Almqvist & Wiksell, Upsal, Sweden, to publish the 4th edition of the „World Directory of Mathematicians”.

- (viii) The Secretary reported that New Zealand had been admitted into IMU, group I.  
 Professor de Rham was appointed IMU's representative on ICSU in 1969/1970 and Professor J. Novák, Prague, was appointed IMU's representative on COSPAR at its meeting in Prague, May 1969.
- (ix) The next General Assembly of IMU will be held in Menton, August 28—30, 1970.

## D. Financial Report.

The Financial Report for 1969 has been presented separately.

## APPENDIX A

### International Conference on Functional Analysis and Related Topics

- S. Agmon (Israel): Lower bounds for solutions of Schrödinger type equations in unbounded domains.
- M. F. Atiyah (U. K.): Global theory of elliptic operators.
- H. Cartan (France): On the structural stability of differentiable mappings.
- J. L. Doob (U. S. A.): Probability and potential theory.
- C. Fofaş (Rumania): The statistical evolutions of the non-stationary solutions of Navier-Stokes equations and their ergodic behaviour.
- T. Fujimagari and M. Motoo (Japan): The characterization of the cascade processes.
- H. Fujita (Japan): On the asymptotic stability of solutions of the equation  $v_t = \Delta v + \exp(v)$ .
- H. G. Garnir (Belgium): Some new results in classical functional analysis.
- L. Hörmander (Sweden): On the singularities of solutions of partial differential equations.
- T. Ikebe (Japan): Scattering for uniformly propagative systems.
- K. Ito (Denmark): Canonical measurable random functions.
- S. Itô (Japan): Ideal boundaries of Neumann type associated with elliptic operators.
- K. Jacobs (Germany): Combinatorial constructions in ergodic theory.
- S. Kakutani (U. S. A.): Classification of ergodic transformations.
- T. Kato (U. S. A.): Some results on potential scattering.
- H. Komatsu (Japan): Boundary values for solutions of elliptic equations.
- T. Kōmura (Japan): Semigroups of operators in locally convex spaces.
- Y. Kōmura (Japan): Nonlinear semigroups in Hilbert spaces.
- I. Kubo (Japan): Representation of quasi-flows with multidimensional parameter.
- H. Kunita (Japan):  $L^2$ -analysis for boundary problems of multidimensional diffusion processes.
- S. T. Kuroda (Japan): A stationary method of scattering and some applications.
- P. D. Lax (U. S. A.): Integrals of nonlinear equations of evolution.
- H. Lewy (U. S. A.): On a minimum problem for superharmonic functions.
- J. L. Lions (France): Some remarks on variational inequalities.
- A. Martineau (France): The "Edge of the Wedge Theorem" in the hyperfunction theory.
- M. Matsumura (Japan): Asymptotic behaviour of solutions of certain mixed problems for symmetric hyperbolic systems with constant coefficients.
- S. Matsuura (Japan): On non-strict hyperbolicity.
- S. Mizohata and Y. Ohya (Japan): On Levi's condition for hyperbolic equations.

- C. B. Morrey, Jr. (U.S.A.): Partial regularity results for elliptic systems.
- J. K. Moser (U.S.A.): On the construction of almost periodic solutions for ordinary differential equations.
- M. K. V. Murthy (India): Some remarks in the theory of pseudodifferential operators.
- M. Nakai (Japan): On parabolicity and Royden compactifications of Riemannian manifolds.
- M. S. Narasimhan (India): Elliptic operators and differential geometry of moduli spaces of vector bundles on compact Riemann surfaces.
- I. Naruki (Japan): An analytic study of real submanifolds of a complex manifold.
- T. Niwa (Japan): On the classical flows with discrete spectra.
- R. S. Phillips and P. D. Lax (U.S.A.): Scattering theory.
- K. Saito (Japan): Schematic theory of analytic spaces.
- M. Sato (Japan): Hyperfunctions and partial differential equations.
- L. Schwartz (France): Cylindrical measures and radonizing maps.
- S. L. Sobolev (U. S. S. R.): Some questions of the theory of functions of many discrete variables.
- G. Stampacchia (Italy): On the regularity of solutions of variational inequalities.
- H. Tanabe (Japan): On regularity of solutions of abstract differential equations.
- I. N. Vekua (U. S. S. R.): On one class of the elliptic systems with singularities.
- M. Yamaguti (Japan): On pseudo difference schemes.
- H. Yoshizawa (Japan): Rotation group of Hilbert space and some of its relations to Brownian motion.
- K. Yosida (Japan): Pre-closedness of Hunt's potential operators and its applications.  
*O. Frostman (Djursholm).*

## IMU Commission on Exchange of Mathematicians

The International Mathematical Union has a Commission on Exchange of Mathematicians. Composition of the Committee:

Chairman: Professor F. Hirzebruch, Mathematisches Institut der Universität Bonn, 53 Bonn, Wegelerstraße 10, Germany.

Members: Professor P. D. Lax, Courant Institute of Mathematical Sciences, New York University, 251 Mercer Street, New York, N. Y. 10012, USA.

Professor A. Zhizhenko, Akademia Nauk, Leninskij Prospekt 14, Moskva V-71, USSR.

Applications for IMU-lecturerships should be sent to the chairman. Applications are accepted from Adhering Organisations, Mathematical Institutes etc.  
*F. Hirzebruch (Bonn).*

*End of the Bulletin of the International Mathematical Union.*