

Bogdan Choczewski

## International meetings organized by Polish schools on functional equations

**Abstract.** This is an extended version of the talk given on the *10th International Conference on Functional Equations and Inequalities* held in September, 2005, in the Mathematical Research and Conference Center of the Polish Academy of Sciences at Będlewo, cf. [A10]. There is presented, first of all, an outline of the history of the ten meetings, organized in Poland by the Institute of Mathematics of the Pedagogical University of Cracow from 1984 to 2005. The article begins with a description of meetings held in Hungary, prior to the ICFEIs, and ends with informations on other conferences and seminars organized by Polish schools of functional equations in the years 1989-2005 (among them, on the *International Symposia on Functional Equations: 27 (1989), 34 (1996) and 40 (2002)*).

### 1. Introduction

The organizing in Poland, by the Institute of Mathematics of the Pedagogical University of Kraków, of the series of the *International Conferences on Functional Equations and Inequalities* (ICFEIs) had been started in 1984. They might be considered as a continuation of meetings held in Hungary in sixties and seventies of the 20th century which were supposed to be satellite ones to the *International Symposia on Functional Equations* (ISFEs). The series of the Symposia had been invented and since 1962 organized by Professor János Aczél (University of Waterloo, ON, Canada), a prominent Hungarian mathematician, who emigrated to Canada in 1964. Thanks mostly to him functional equations became a rapidly developing domain of research in contemporary mathematics.

The “birth” of functional equations in Poland we owe to Professor Stanisław Gołąb and his scientific cooperation with Professor Aczél. Then, in early sixties, a school of functional equations, especially those in a single variable, has been created at the Silesian University in Katowice by Professor Marek Kuczma, encouraged by Professor Gołąb, his Master and Teacher. Marek Kuczma’s

scientific career begun in 1956 at Kraków, where in that time were investigated, mostly by Professor Gołąb and his students: Zenon Moszner and Andrzej Zajtz, mainly functional equations in several variables, connected with the theory of geometric objects. In 1967, Professor Kuczma organized, in cooperation with Professor Gołąb, the first international conference on functional equations in Poland.

The article is edited as follows. We first mention Hungarian conferences (held from 1962 to 1986) and then describe in general, with some statistical data included, all the 10 ICFEIs (from 1984 to 2005). More on the separate ICFEIs is found in the three sections describing the first two, next six and the last two meetings. For each of the ICFEIs we provide informations under the headings: **A. Guests** (names of those colleagues from behind Hungary and Poland who came this time only), **B. Problems** (names of contributors in proposing and solving them during the meeting, with topics labelled only), **C. Papers** (presented on the meeting and printed in the volume in which the respective report is printed). We also remind, according to author's choice, major events characteristic for the meeting in question. The paper is concluded with registering other international meetings of specialists in the fields represented at the ICFEIs, held in Poland after 1967.

## 2. Conferences in Hungary

In the times of the “iron curtain” in Europe it was an uneasy task for people from the East to attend any conference held on the West. Our coming to the ISFEs in those times was possible for many of us only because Professor Aczél and colleagues stimulated by him were always going to an effort in supporting us in various ways. This situation encouraged members of the Hungarian school of functional equations – students of Professor Aczél and their students – to initiate in sixties a series of international conferences on functional equations and inequalities, parallel to the ISFEs, the first four of which were held in 1962, 1963, 1965 and 1966 at Oberwolfach.

The first international conference in Hungary on which functional equations appeared as a separate topic was that held in 1962 at Sárospatak. Then three *Colloquia on Functional Equations* took place in the University of Heavy Industry at Miskolc, in 1966, 1968 and 1970. The main organizer of these meetings was Professor Endre Vincze. The next meetings were organized by the Institute of Mathematics of the University of Debrecen under the chairmanship of Professor Zoltán Daróczy in 1973 and 1979 at Debrecen and in 1986 at Noszvaj. They all were addressed mainly to younger Hungarian and Polish mathematicians, who rather would be unable to participate in the ISFEs as well as in the series of “General Inequalities” held several times at Oberwolfach.

From the report on the *3rd Colloquium at Miskolc* (1970), compiled by M. Hosszú and published in the *Aequationes Mathematicae* (cf. [B1]), we learn that its Organizing Committee consisted of Professors: Z. Daróczy (Debrecen), A. Moór (Sopron) and Gy. Gáspár, M. Hosszú and E. Vincze (all from Miskolc) and that among 39 participants from 5 countries there were 21 Hungarian and 11 Polish ones (in particular, Professors S. Gołąb and M. Kuczma).

The report on the second *Debrecen Symposium* (1979) was compiled by the secretary of the meeting, K. Lajkó, and published in the *Publicationes Mathematicae Debrecen* (cf. [B2]). Among 70 participants from 13 countries there were 32 from Hungary (with the members of the Organizing Committee, Professors J. Balázs, Z. Daróczy, I. Fenyő, M. Hosszú, A. Kósa, L. Losonczi, E. Vincze and also I. Kátai, A. Moór and E. Gesztelyi, A. Járai, Gy. Maksa, Zs. Páles, Gy. Szabó, Á. Szász, L. Szekelyhidi); 20 from Poland (with Prof. M. Kuczma and K. Baron, D. Brydak (who came from Port Harcourt, Nigeria), B. Choczewski, S. Czerwik, R. Ger, W. Jarczyk, Z. Kominek, M.E. Kuczma, S. Midura, K. Nikodem, A. Smajdor, S. Wołodźko, M.C. Zdun) and mathematicians known in their fields: D.D. Bainov (Bulgaria, differential-functional equations), W. Benz (West Germany, geometry), S. Bilinski (Yugoslavia, geometry), L. Collatz (West Germany, numerical mathematics), H.-H. Kairies (West Germany, functional equations), P.G. Peljukh (USSR, differential and functional equations), L. Reich (Austria, iteration theory), A.N. Sarkovskii (USSR, functional and differential equations), D.R. Snow (USA, functional equations), W. Walter (West Germany, mathematical analysis).

### 3. Ten ICFEIs in general (with statistical data)

Despite of a rather difficult situation in Poland, the Institute of Mathematics of the Pedagogical University of Kraków decided to realize in 1984 the idea of Professor Dobiesław Brydak and organized in Poland a conference like the Hungarian ones, presented in the preceding section. The first ICFEI was the beginning of a series of conferences that became biannual since that held in 1991 at Koninki. They have got the nickname “Brydak’s conferences”, as Professor Brydak was the chairman of the organizing committee of all the nine ICFEIs, and of the scientific committee of the tenth one. To keep the character of Hungarian meetings, the invitations were sent to leading specialists in the field, but also everybody recommended by her or his master could be invited and give a talk on an ICFEI.

Professor Brydak was supported in his organizational work by Professor Bogdan Choczewski (except of 1995, co-chairman in) and – in the years 1984 and 1987 – by Professor Józef Tabor. The following colleagues acted as scientific secretaries: Lech Anczyk (1st), Erwin Turdza (2nd), Barbara Wilk (3rd), Ewa Dudek (4th), Zbigniew Leśniak (5th and 6th), Jacek Chmieliński (from 7th to 10th).

Since 1991 (3rd ICFEI) in the course of preparation of meetings and at their places in the office as the secretary worked Miss Janina Wiercioch and as the technical assistant – Mr Władysław Wilk. They were helped by: Miss Anna Bańdur (1993, 1999 (as Mrs. Grabiec)), Miss Danuta Bogocz (1993), Miss Ewa Dudek (from 1991 to 2001), Dr Paweł Solarz (2003, 2005), Dr Joanna Szczawińska (2003).

In the table below some statistical data concerning all the 10 meetings are collected (the columns “All” and “Foreign” refer to the number of participants, and “P&R” means “Problems&Remarks”). The data are taken from the complete list of participants which has been compiled by Miss J. Wiercioch.

No	Time;place	All	Foreign	Sessions	Talks	P&R	Countries
1.	May 27-June 2, 1984; Sielpia	59	9	8	41	8	8
2.	June 21-27, 1987; Szczawnica	63	24	16	44	10	10
3.	September 3-9, 1991; Koninki	80	21	14	54	9	12
4.	February 15-22, 1993; Krynica	73	16	19	43	17	8
5.	September 4-9, 1995; Złockie	63	27	19	55	7	14
6.	June 1-7, 1997; Złockie	63	18	19	52	9	11
7.	September 12-18, 1999; Złockie	73	28	19	63	14	14
8.	September 10-15, 2001; Złockie	56	16	18	47	7	8
9.	September 7-13, 2003; Złockie	57	22	17	51	8	8
10.	September 11-17, 2005; Będlewo	64	14	20	59	11	10
Total		650	194	169	509	100	

Here the numbers of attendances: 650 (All) and 194 (Foreign) were obtained as weighted sums with the number of components equal to those of different persons who participate in an ICFE: 230 (All) and 95 (Foreign). Altogether in 10 ICFEIs there were represented 27 countries. The number of Hungarian participants was 61 all, what means that except of 10th ICFEI, it was the greatest from among that of foreign guests, and was equal (consecutively): 2, 8, 4, 5, 8, 5, 8, 8, 12, 1. It was also registered that 58% of foreign participants and 38% of Polish ones took part in a single meeting only.

We now exhibit the names of the participants who attended the maximal number of our conferences (in brackets: the years of missed meetings).

Polish participants.

All ten: Karol Baron, Dobiesław Brydak, Roman Ger, Witold Jarczyk, Zygfryd Kominek, Maciej Sablik.

Nine: Bogdan Choczewski (1995), Kazimierz Nikodem (1999), Andrzej Smajdor (1993), Józef Tabor (2003), Marek Cezary Zdun (2001).

Eight: Jacek Chmieliński (1984, 1987), Marek Czerni (2003, 2005), Zbigniew Leśniak (1984, 1987), Janusz Matkowski (2001, 2003), Zenon Moszner (2003, 2005), Zbigniew Powązka (1989, 2005), Wilhelmina Smajdor (1991, 1993), Janusz Walorski (1984, 1987).

Foreign participants.

Eight: Wolfgang Förg-Rob (Austria; 1984, 1997), Hans-Heinrich Kairies (Germany; 1984, 1987), Peter Volkmann (Germany; 1995, 1997).

Six: Zoltán Daróczy, Károly Lajkó, Zsolt Páles (all from Hungary).

Five: Nicole Brillouët-Belluot (France), Roland Girgensohn (Germany), Laszlo Losonczi (Hungary), Gyula Maksa (Hungary), František Neuman (Czech Republic), Adolf Schleiermacher (Germany).

We conclude this section with the names of our late colleagues, indicating in brackets the years they had attended the ICFEI:

Zbigniew Gajda, Silesian University in Katowice (1984, 1987, 1991), †1992;

Zbigniew Wilczyński, Pedagogical University in Rzeszów (1984, 1987, 1991), †1994;

György Szabó, University of Debrecen (1987, 1993, 1995), †1996;

György Targonski, University of Marburg (1991, 1995, 1997), †1998;

Jerzy Popena, University of Technology in Poznań (1991), †1999;

Eric Russell Love, University of Melbourne (1984, 1987, 1991, 1995), †2001;

Ioana Cioranescu, University of Puerto Rico (1997), †2003;

Wojciech Ślepak, Technical-Humanistic Academy in Bielsko-Biała (1993), †2005.

#### 4. First two meetings

**The first ICFEI** was held in 1984 at Sielpia (in Kielce region) in the rest house “Komunalni”. The welcoming address was given by Professor Zenon Moszner, Rector Magnificus of the Pedagogical University of Kraków. There were 9 foreign (listed below) and 30 Polish participants, cf. [A1].

Our foreign gusests came from 7 countries: Gian Luigi Forti (Italy), Eric Russell Love (Australia), Bertalan Nagy (Hungary), František Neuman (Czechoslovakia), Jürg Rätz (Switzerland), Ludwig Reich (Austria), Endre Vincze (Hungary), Peter Volkmann (West Germany), Roger James Wallace (Australia).

Professor Dieter Keith Ross from the La Trobe University (Australia) died at the age of 51 of a fatal heart attack at Frankfurt Airport on 27th May, 1984, while on his way to our meeting. His lecture was delivered by R.J. Wallace (cf. the abstract in [A1], 243), his student and co-worker from the same University. An obituary note written by E.R. Love is printed in [A1], 191-192.

There were 15 participants of the 1st ICFEI who came also to the 10th ICFEI. Among them Prof. Volkmann was the only foreign guest, and the Polish ones were (actual affiliation): Karol Baron (Uniwersytet Śląski w Katowicach), Dobiesław Brydak (Akademia Pedagogiczna w Krakowie), Bogdan Choczewski (Akademia Górniczo-Hutnicza w Krakowie), Roman Ger (Uniwersytet Śląski w Katowicach), Witold Jarczyk (Uniwersytet Zielonogórski), Zygfyd Kominek (Uniwersytet Śląski w Katowicach), Andrzej Mach (Akademia Pedagogiczna w Kielcach), Janusz Matkowski (Uniwersytet Zielonogórski), Kazimierz Nikodem (Akademia Techniczno-Humanistyczna w Bielsku-Białej), Maciej Sablik (Uniwersytet Śląski w Katowicach), Andrzej Smajdor (Akademia Pedagogiczna w Krakowie), Wilhelmina Smajdor (Politechnika Śląska w Gliwicach), Józef Tabor, (Uniwersytet Rzeszowski), Marek Cezary Zdun (Akademia Pedagogiczna w Krakowie).

Let us note that they all are now leading specialists in the field of functional equations in their centres of research, 7 of them have the scientific title of professor of mathematical sciences, and 6 others have the position of university professors.

**B. Problems** ([A1], 255-265). G.L. Forti (1. Hyer's stability theorem for non Abelian groups, 2. From number theory, 3. Cauchy's equation on the graph of a given function), J. Gómez-Bayón (functional equation related to the problem of strength of tendons, presented by B. Choczewski, partially solved by F. Neuman), K. Nikodem (representation of two functions: Jensen convex majorized by Jensen concave; partially solved by Z. Kominek), L. Reich (determining families of multiplicative functions satisfying a special relation), Z. Skupień (a variant of generalized Aczél-Fuchs problem), J. Tabor (stemming from author's partial solution of Forti's Problem 1.).

### C. Papers.

K. Baron, *A remark on the stability of the Cauchy equation*, 7-12.

J. Baster, Z. Moszner, J. Tabor, *On the stability of some class of functional equations*, 13-34.

J. Krzyszkowski, *On ordinary differential inequalities*, 95-108.

E.R. Love, *Inequalities like Opial's inequality*, 109-118.

F. Neuman, *A note on smoothness of the Stäckel transformation*, 147-152.

J. Tabor, *Rational iteration groups*, 153-176.

P. Volkmann, *Caractérisation de la fonction  $f(x) = x$  par un système de deux inéquations fonctionnelles*, 177-184.

**The 2nd ICFEI** was held in 1987 at Szczawnica (a spa in the region of Pieniny mountains) in a health house “Papiernik”. The welcoming address was given by Professor Józef Tabor, Dean of the Faculty of Science and Technology of the Pedagogical University of Kraków. There were 24 foreign and 40 Polish participants, cf. [A2].

Professor Marek Kuczma who was unable to come because of illness, had sent his special greetings for all the participants.

**A. Guests.** Ravi P. Agarwal (Singapore), Jean Dhombres (France), Serge Dubuc (Canada), Detlef Gronau (Austria), Albert W. Marschall (Canada), Gradimir V. Milovanović (Yugoslavia), Jens Schwaiger (Austria), Abe Sklar (USA), Jaroslav Smítal (Czechoslovakia).

**B. Problems** ([A2], 223-234). Professor Zoltán Daróczy proposed two open problems: a) whether convexity is the difference property in de Bruijn’s sense, b) find continuous solutions of Hosszu’s functional inequality. They were partially solved during the meeting, a) by R. Ger and Z. Kominek and b) by Gy. Maksa, Zs. Páles, Z. Kominek and K. Nikodem. Other problems were posed by S. Dubuc (continuous solutions of a functional equation of infinite order); Zs. Páles (functional inequality with arithmetic and geometric means); L. Székelyhidi (groups on which biadditive functions are products of additive ones).

## 5. Six biannual meetings, 1991-2001

**The 3rd ICFEI** was held in 1991 at Koninki (a village at foot of Gorce mountains) in the hostel “Mechanik”. The welcoming address was given by Professor Zenon Uryga, Rector Magnificus of the Pedagogical University of Kraków. There were 21 foreign and 59 Polish participants, cf. [A3].

The meeting took place 3 months after the death, on June 13, 1991, of Professor Marek Kuczma, the founder of the School of Functional Equations at the Silesian University in Katowice. There was a commemorative session on Sunday, September 8, chaired by Roman Ger who presented the biography of Professor Kuczma. Then Marcin E. Kuczma through very personal reminiscences brought the audience nearer to his brother’s reach personality. In this spirit spoke also D. Brydak, B. Choczewski, J. Matkowski, L. Reich, Gy. Targonski and M. Taylor.

**A. Guests.** Vitor Manuel Carvalho das Neves (Portugal), Alice Chaljub-Simon (France), Bruce R. Ebanks (USA), Mark Taylor (Canada).

**B. Problems** ([A3], 30-36). G.L. Forti (three problems on a generalized plurality function; and to partial solutions of two of them were presented by Z. Gajda, Z. Kominek and M. Sablik; Z. Moszner (a characterization of solutions to the translation equation); Gy. Targonski (integral equation related to the notion of “phantom iterates”).

**C. Papers.** The proceedings were published in 1993 in the form of a booklet [A3] by the Institute of Mathematics of the Pedagogical University of Kraków. An obituary note appeared there as a separate item:

D. Brydak, B. Choczewski, R. Ger, *Marek Kuczma (1935-1991)*, 3-4.

**The 4th ICFEI** was held in 1993 at Krynica in the house “Walcownik”. The welcoming address was given by Professor Stefan Turnau, the Dean of the Faculty of Science and Technology of the Pedagogical University of Kraków. There were 16 foreign and 57 Polish participants, cf. [A4].

It was the only ICFEI held in winter. A lot of snow had created some communicational problems. The meeting was devoted mainly to stability theory of functional equations.

Only on this and on the preceding ICFEI there were several talks given by mathematicians from the University of Technology in Poznań dealing with difference equations, especially with asymptotic and oscillatory properties of their solutions. In 1991 there were 10, and in 1993 – 9 participants from Poznań, who came to both meetings with their leader, Professor Dobiesław Bobrowski.

**A. Guests.** Wolfgang Sander (Germany).

**B. Problems** ([A4], 59-68). Z. Daróczy and I. Kátai (characterization of the identity function on  $\mathbb{N}$  via multiplicative and additive Cauchy equation, both on restricted domains); G.L. Forti (stability of an equation and the knowledge of the form of its solutions); L. Losonczi (general solution of a fundamental equation of information theory); Z. Powązka (a system of functional equations characterizing the operator of derivation; followed by a remark of M. Rose); Gy. Szabó (constancy of “set-periodic functions in  $\mathbb{R}^n$ ”); L. Székelyhi (stability of Hosszu’s equation).

**C. Papers.** The proceedings were published in 1993 in the form of a booklet [A4] by the Institute of Mathematics of the Pedagogical University of Kraków. As a separate item there appeared Professor Ger’s paper (with the bibliography containing 83 items), based on his invited talk:

R. Ger, *A survey of recent results on stability of functional equations*, [A4], 5-36.

**The 5th ICFEI** was held in 1995 at Muszyna-Złockie in the house “Geofizyk”. The meeting was opened by Professor Dobiesław Brydak, the Chairman of the Organizing Committee. There were 27 foreign and 36 Polish participants, cf. [A5].

The house “Geofizyk” became the place of the next four meetings.

**A. Guests.** Aurelio Cannizzo (Italy), Gregory Derfel (Israel), Mohamed Hmissi (Tunisia), Gorazd Lešnjak (Slovenia), Prasanna K. Sahoo (USA).



**B. Problems** ([A5], 195-198). I. Corovei (Jensen's functional equation on special groups); W. Jarczyk (on subadditive functions); Á. Szász (on continuous linear maps in normed spaces; solved by Zsolt Páles); Jacek Tabor (student of the Jagiellonian University, son of Józef Tabor – stability of the Cauchy equation on a restricted domain (he gave a talk on Hahn–Banach Theorem and made a remark on the unstability of the Hosszú functional equation on the unit interval)).

**C. Papers.**

- R. Badora, *On the stability of the cosine functional equation*, 5-14.  
 A. Cannizzo, *Geometrical convexity and the Artin functional equation*, 37-48.  
 Z. Daróczy, *Functional inequalities for infinite series*, 57-62.  
 M. Hmissi, *On the functional equation of exit laws for lattice semigroups*, 63-72.  
 H.-H. Kairies, *Takagi's function and its functional equations*, 73-84.  
 Pl. Kannappan, T. Riedel, P. Sahoo, *On a generalization of a functional equation associated with Simpson's rule*, 85-102.  
 J. Matkowski, K. Nikodem, *Convex set-valued functions on  $(0, \infty)$  and their conjugate*, 103-108.  
 Z. Moszner, *Sur une probléme de Marley*, 109-118.  
 Z. Powązka, *Sur une équation fonctionnelle associée à l'équation de Jensen*, 119-128.  
 A. Smajdor, *Superadditive solutions of a functional equation*, 129-138.  
 Á. Szász, *Oscillation and integration characterizations of bounded a.e. continuous functions*, 139-170.

**The 6th ICFEI** was held in 1997 at the same place as the 5th ICFEI. The welcoming address was given by Professor Eugeniusz Wachnicki, the Dean of the Faculty of Science and Technology of the Pedagogical University of Kraków. There were 18 foreign and 45 Polish participants, cf. [A6].

In a talk given by Pofessor Bogdan Choczewski there was reminded the 30th anniversary of the first International Conference on Functional Equations ever held in Poland, which had been organized by Professors S. Gołąb and M. Kuczma at Zakopane in October 9-13, 1967 (there were 47 participants, among them 16 who came from East Gemany (1), Hungary (9), Rumania (3) and Yugoslavia (3)).

**A. Guests.** Ioana Cioranescu (Puerto Rico), Luigi Paganoni (Italy).

**B. Problems** ([A6], 146-152). B. Choczewski recapitulated an unsolved problem posed by Professor Gołąb in 1967 on determining the inner product with the aid of thenorm ([A6], 146). The problem has been solved by R. Ger ([A6], 147-149). Z. Daróczy quoted a problem posed in a Hungarian journal for high school students on a characterization of affine functions via a functional equation and asked for its elementary solution.

**C. Papers.**

- B. Choczewski, *The First International Conference on Functional Equations in Poland: Zakopane 1967*, 5-14.
- Z. Kominek, W. Wilczyński, *On sets for which the difference set is the whole space*, 45-52.
- Z. Moszner, *L'équation de translation et l'équation de Sincov généralisée*, 53-72.
- A. Smajdor, *Concave iteration semigroups of Jensen set-valued functions*, 73-84.
- E. Wachnicki, *Sur une équation intégrale-fonctionnelle*, 95-104.

**The 7th ICFEI** was held in 1999 at Złockie in the hotel "Geovita" (the new name of "Geofizyk" after a change of the owner). The welcoming address was given by Professor Eugeniusz Wachnicki, the Dean of the Faculty of Science and Technology of the Pedagogical University of Kraków. There were 28 foreign and 45 Polish participants, cf. [A7].

We were honoured by coming of the dignified guest, Professor János Aczél (University of Waterloo, ON, Canada), upon whom the University of Technology at Miskolc conferred on September 11, 1999, the degree of Doctor Honoris Causa. It was the fourth of his honorary doctorates, the previous being awarded by the Universities in Karlsruhe (Germany), Graz (Austria) and Katowice (Poland). Prof. Aczél gave us a talk entitled *The strictly monotonic solutions of a functional equation arising from coordination of two ways to measure utility* based on a paper written jointly with Gy. Maksa and Zs. Páles.

There were present 8 colleagues from the University of Debrecen: Zoltán Boros, Zoltán Daróczy, Tibor Farkas, Attila Gilányi, Károly Lajkó, Gyula Maksa, Zsolt Páles, László Székelyhidi.

**A. Guests.** Thomas M.K. Davison (Canada), Lech Maligranda (Sweden), Alexander N. Šarkovskii (Ukraine), Marina Borisovna Vereikina (Ukraine).

**B. Problems** ([A7], 192-198). J. Aczél (1. Elementary solution of a geometrical problem; 2. G. Pickert's (Germany) on the translation equation (followed by remarks of Z. Moszner); 3. J. Bukszár's (Hungary) on an "integrated Cauchy equation"; 4. A.W. Marschall's (Canada) – on Chini's equation (followed by contributions to its solution of the speaker and by T. Riedel with M. Sablik); Z. Daróczy and Zs. Páles (equivalence of two inequalities related to Jensen's one without any regularity assumptions); T.M.K. Davison (characterizing a special set of polynomials with integer coefficients); L. Maligranda (form of a function occurring in the theory of Orlicz spaces); L. Székelyhidi (when the shape of terms of a sequence involving  $2\mathbb{Z}$ -periodic functions is preserved after taking the limit).

**C. Papers.**

- T.M.K. Davison, *D'Alembert's functional equation and Chebyshev polynomials*, 31-38.

- H.-H. Kairies, *On a Banach space automorphism and its connections to functional equations and continuous nowhere differentiable functions*, 39-48.
- Pl. Kannappan, G.H. Kim, *On the stability of the generalized cosine functional equations*, 49-58.
- Z. Moszner, *Sur les généralisations du wronskien*, 85-100.
- F. Neuman, *Functional and differential equations*, 109-116.
- T. Riedel, K. Wallace, *On a Pexider type equation on  $\Delta^+$* , 129-138.
- A. Wach-Michalik, *On a problem of H.-H. Kairies concerning Euler's Gamma function*, 151-162.

In his closing address of Professor Brydak two our colleagues were commemorated. Professor György Targonski, the creator and organizer of the series of *European Conferences on Iteration Theory*, passed away at the age of 69, on January 10, 1998, in Munich (cf. Section 7). Mr Martin Grinč (Slovakia), Ph. D. student of W. Jarczyk at the Silesian University of Katowice, who was expected to be among us, died of cancer at the age of 28, on January 18, 1999, in Stará L'ubovná, just after submitting his Ph. D. thesis.

**The 8th ICFEI** was held in 2001 at the same place as the preceding one. The welcoming address was given by Professor Michał Śliwa, Rector Magnificus of the Pedagogical University of Kraków. There were 16 foreign and 40 Polish participants, cf. [A8].

Our conference was held only 3 weeks after the annual 39th ICFEI (Sandbjerg, Denmark, August 12-18), because of circumstances independent on the organizers of both meetings.

Another coincidence was the Annual Meeting of the Polish Mathematical Society held from September 11 to September 14 at Nowy Sącz (some 40 km far from Złockie). On Wednesday, 12th of September, Professor Ger gave there an invited talk on the development of research in Poland in the domain of functional equations, which was attended by the most of Polish participants of our conference.

The 8th ICFEI will be kept for long time in the memory of all participants also because of that Tuesday, 11th of September, when we have learned on the unconceivable terroristic attack on the World Trade Center in New York City. Next day, after Professor Riedel's (Louisville, KY, USA) talk, we joined our hands in a Solidarity Chain to express sympathy and communion with American people.

**B. Problems** ([A8], 81-90). Z. Moszner (problem of T. Mitchell (USA), having relations to economics, communicated to the speaker by J. Aczél); Zs. Páles (1. Approximate sandwich theorem; the problem solved jointly by him and L. Székelyhidi (5. Remark in [A8], 83-85)); 2.  $(\varepsilon, \delta)$ -Wright-convex functions); J. Wesolowski (obtaining under weaker assumptions results on solutions

of several new functional equations satisfied by bijections preserving independence of random variables, similar to those presented as remarks (7. Problems, [A8], 87-90, cf. also his talk on the matrix case, [A8], 79-80)).

### C. Papers.

B. Choczewski, Z. Kominek, *A proof of S. Rolewicz's conjecture*, 5-12.

H.-H. Kairies, *Spectra of certain operators and iterative functional equations*, 13-22.

Z. Moszner, *La fonction d'indice et la fonction exponentielle*, 23-38.

A. Schleiermacher, *Some consequences of a theorem of Liouville*, 39-54.

## 6. The last two meetings

They are treated here in a concise manner, following the lines of presentation of the former ICFEIs, as the reports on both meetings are printed in the same volume.

**The 9th ICFEI** was held for the fifth time in Złockie. The welcoming address was given by Professor Eugeniusz Wachnicki, Deputy Rector of the Pedagogical University of Kraków. There were 22 foreign and 35 Polish participants, cf. [A9], 122-125.

The participants have signed a congratulation address to Professor János Aczél who had been promoted to the degree of Doctor Honoris Causa on June, 2003, by the University of Debrecen.

A special letter has been sent to Mrs. Irena Gołąb, wife of Professor Gołąb, on her 100th birthday, celebrated on July, 2003.

Congratulations were also conveyed to Professor Stanisław Midura from Rzeszów, who attended 7 of our conferences, on the occasion of his 70th birthday.

**A. Guests.** Shin-ichi Nakagiri (Japan), Themistocles M. Rassias (Greece).

**B. Problems** ([A9], 119-122). I. Corovei (Cluj-Napoca) (on Steffensen's inequality; presented by B. Choczewski; together with remarks); Z. Daróczy (on translative and quasi-commutative operations on groups; followed by M. Sablik's remark); H.-H. Kairies (on a set connected with Schröder's equation); Zs. Páles (three problems concerning  $(\frac{1}{3}, \frac{2}{3})$ -convexity); Th.M. Rassias (on the stability of the orthogonality equation; together with remarks).

### C. Papers.

Sh. Haruki, Sh. Nakagiri, *Functional equations arising from the Cauchy-Riemann equations*, 59-76.

H.-H. Kairies, *On continuous and residual spectra of operators connected with iterative functional equations*, 51-57.

**The 10th ICFEI** was held at Będlewo in the Mathematical Research and Conference Center, a branch of the Institute of Mathematics of the Polish Academy of Sciences. The welcoming address was given by Professor Marek Cezary Zdun, the Dean of the Faculty of Science and Technology of the Pedagogical University of Kraków. There were 14 foreign and 50 Polish participants, cf. [A10], 162-164.

The Organizing Committee of the jubilee meeting acted this time under the chairmanship of Professor Janusz Brzdęk and consisted of Dr. Paweł Solarz, Miss Janina Wiercioch and Mr Władysław Wilk. The members of the Scientific Committee were Professors: Dobiesław Brydak (Chairman), Bogdan Choczewski, Roman Ger, Marek Cezary Zdun and Dr. Jacek Chmieliński (Secretary).

The talks focused on the following topics: stability theory of functional equations, functional equations in several variables, iterative functional equations, functional inequalities (in particular: convexity); multifunctions, iteration theory; applications. They were in programme of almost all ICFEIs; with stability, multifunctions, iteration theory being the topics attracting recently the attention of more researchers.

The jubilee of the 10th ICFEI, joined with that of the 70th birthdays of Professors Dobiesław Brydak and Bogdan Choczewski, the organizers of the previous Conferences, was celebrated on a festive banquet on Thursday, September 15, 2005. Professor Roman Ger made a hearty speech on this occasion, and the jubilees obtained special addresses signed by all the participants of the 10th ICFEI in which one reads, among others: *The Conference has always been very important for Polish Mathematicians working in the field of functional equations. The international significance of this is shown by the enclosed list of countries from which the participants of all the 10 Conferences have originated.*

In his closing address Professor Choczewski announced that Professor Brydak has been named Honorary Chairman of the Scientific Committee of the next ICFEI. He also congratulated Professor Marian Kwapisz (from the Casimir the Great University in Bydgoszcz, present also on the 6th ICFEI) on the occasion of his 70th birthday.

**A. Guests.** Lyudmila Efremova (Russia), Boris Paneah (Israel), Vasile D. Popa (Romania), Vsevolod Sakbaev (Russia), Ekaterina Shulman (Israel), Bing Xu (China) (Professor P.V. Subrahmanyam (Indian Institute of Technology Madras, Chennai, India) who had an insufficient visa was stopped on the Polish border on his way to Będlewo.)

**B. Problems** ([A10], 155-162). V. Mityushev (1. Linear iterative functional equation with singularity; followed by a remark by J. Walorski on its solvability, 2. Functional equation arisen in the diffraction theory); K. Nikodem (concerning  $\lambda$ -convexity); G. Toader (of Matkowski-Sutô type).

### C. Papers.

M. Piszczek, *Second Hukuhara derivative and cosine family of linear set-valued functions*, 87-98.

The current year was also the jubilee year for two distinguished colleagues from the Pedagogical University of Kraków.

Professor Zenon Moszner, who had attended all the ICFEIs except of the last two, observed the anniversary of his 75th birthday. The 50th anniversary of his work at the same University and of his 70th birthday were celebrated by his University in 2000. A special volume of the *Annales Academiae Paedagogicae Cracoviensis Studia Mathematica* [B3] dedicated to him contains 28 papers of 34 authors (other 8 papers with dedication, of 9 authors, are found in [A7]).

Professor Andrzej Zajtz, who had participated in the first and in the second ICFEI celebrated his 70th birthday. During a special meeting held in October, 2005, at the Institute of Mathematics of the Pedagogical University in Kraków a volume of the *Annales Academiae Paedagogicae Cracoviensis Studia Mathematica* [B4], containing 19 papers (of 30 authors) dedicated to the Jubilee had been presented to him by Professors Jacek Gancarzewicz and Eugeniusz Wachnicki, the editors of the volume.

## 7. Other relevant international meetings held in Poland

For the sake of completeness, we register below and comment other meetings on functional equations, inequalities, and related topics which had been organized in Poland after the Conference at Zakopane in 1967 (cf. Sections 1, 5, and [B12]).

### **The 27th International Symposium on Functional Equations, 1989.**

Held from August 14 to 24, first at Bielsko-Biała, then at Katowice and Kraków (cf. [B5]), it was organized by the Bielsko-Biała Branch of the Łódź Technical University, by the Silesian University of Katowice, and by the Pedagogical University of Kraków. The Organizing Committee consisted of Professors J. Aczél (Waterloo, ON, Canada), B. Choczewski (Kraków), R. Ger (Katowice), J. Matkowski (Bielsko-Biała), J. Rätz (Bern) and A. Sklar (Chicago). Dr. L. Anczyk acted as secretary of the symposium. There were 8 sponsoring institutions. The 64 participants came from 13 countries (25 from Poland).

It was the first ISFE ever held in East Europe. There were 59 talks and 36 contributions in problems-and-remarks sessions. Three special sessions were organized: *Functional Equations in the Teaching of Mathematics* – by Professor C. Alsina (6 contributors); *Functional Equations and Functional Inequalities in Functional Analysis* – by Professors J. Matkowski and J. Rätz (6 contributors) and *Some Applications of Functional Equations Outside Mathematics* – by Professors J. Aczél and F. Stehling (5 contributors).

For the last time in his life Professor Marek Kuczma was able to participate actively in a conference. On the Katowice session of the symposium he gave us a talk *A functional equation reflecting a mean value property “without mean values and derivatives” in fields of characteristics 2* ([B5], 285-286), was the co-author of Professor Aczél’s talk ([B5], 265-266) and (with T.M.K. Davison) – of a remark to this talk (35. Remark, [B5], 322).

**The Polish-Austrian Seminar on Functional Equations and Iteration Theory, 1994.** Held from October 26 to 31 at Cieszyn (cf. [B6]), it was the last of three meetings gathering representatives of Austrian and Polish schools of researchers in the domain, mainly from Graz and Katowice. The Seminar was attended by 34 persons: 9 from Austria, 1 from Canada and 24 from Poland. There were 29 papers presented, and 19 of them (of 27 authors), were published in the special volume [B6] of the *Annales Mathematicae Silesianae*, in 5 thematic groups: functional equations in several variables (5 papers), iterative functional equations (4), Hyers–Ulam stability (4), iteration theory (3), set-valued functions (3).

The first two, Austrian-Polish Seminars, were held at the Karl-Franzens Universität Graz, in May, 1986 and in October, 1991. The leaders of the native groups participating in the three Seminars, and their main organizers, were Professors Ludwig Reich (Graz) and Roman Ger (Katowice). A part of 1991 Seminar, held 4 months after Professor Kuczma’s death, was dedicated to his memory, and his scientific legacy was presented in the special lectures delivered by: Karol Baron *M. Kuczma’s papers on iterative functional equations* ([B7], 1-6), Bogdan Choczewski *Papers of Marek Kuczma written in the last decade of his life* ([B7], 7-16) and Roman Ger *M. Kuczma’s papers on functional equations in several variables* ([B7], 17-28).

**The 34th International Symposium on Functional Equations, 1996.** Held from June 10 to 19 at Wisła-Jawornik (cf. [B8]), it was organized by the Silesian University of Katowice under the honorary patronage of the Polish Parliamentary Commission on Education, Science and Technical Progress. The Organizing Committee consisted of Professors J. Aczél, W. Benz (Hamburg), R. Ger and J. Rätz. Dr. R. Badora acted as secretary of the symposium. There were 9 sponsoring institutions. The 67 participants came from 15 countries (27 from Poland).

The formal opening of the Symposium was preceded by the ceremonial award of the degree of Doctor Honoris Causa to Professor János Aczél by the Silesian University of Katowice. There were 59 talks and 28 contributions in problems-and-remarks sessions. Professor Kazimierz Nikodem presented a survey talk *Functional equations for set-valued functions*. Two special sessions were organized: *Selection Models* – by Professor J. Aczél (4 contributors) and *Hyers-Ulam Stability* – by Professor R. Ger and J. Tabor (9 contributors).

The ISFE medals for outstanding contributions to the meeting were awarded to Zsolt Páles and Jacek Tabor.

After his resignation from the Scientific Committee at the end of this Symposium, Professor Aczél was named, and warmly applauded, Honorary Chairman of the Symposia. He is succeeded in the Committee by Professors Roman Ger and Ludwig Reich (Graz).

**The European Conference on Iteration Theory 1998.** Held from August 30 to September 5 at Złockie, it was organized by the Pedagogical University of Kraków. The Scientific Committee consisted of Professors Laura Gardini (Urbino), Christian Mira (Toulouse), Luigi Paganoni (Milan), Ludwig Reich (Graz), José Sousa Ramos (Lisbon), Jaroslav Smítal (Opava) and Marek C. Zdun (Kraków, local organizer). Dr. Z. Leśniak acted as secretary of the conference. There were 51 participants who came from 11 countries. Altogether 44 talks were presented, and 23 articles are printed in a special issue of the *Annales Mathematicae Silesianae* [B9].

The Conference was 12th in the series of biannual meetings initiated and chaired by the late Professor György Targonski. Organized for the first time in Poland, it was dedicated to the memory of the Founder. The commemorative talk was given by B. Choczewski and the article by him and by Jolán Targonski *György Targonski's life and work* is published in [B9], 9-32. It contains the complete list of Professor Targonski's scientific legacy: 50 papers, 59 other contributions (mainly during conferences), 7 co-edited volumes containing Proceedings of ECITs since 1984.

**The Thousandth Seminar on Functional Equations, 2002.** This was a Festive Session, held on April 9 at Katowice of the *Seminar on Functional Equations* which was founded in 1964 by Professor Marek Kuczma in Katowice. There were 94 participants, among them 6 foreign guests who came from Austria (1), Czech Republic (2), Hungary (2) and Slovakia (1). From the booklet [B10], prepared by Professors Roman Ger and Maciej Sablik (with lists of participants and statistics compiled by Dr. Tomasz Powierża and Dr. Tomasz Szostok) one learns that the number of persons that participated in at least one of Seminars is equal to 239 (40 from abroad) and that of speakers equals 126 (25 from abroad), cf. [B10], 39-49. In R. Ger's historical article in [B10], 9-23, one finds a long list of subject matter of talks presented at the 999 sessions of the Seminar. To recall only numbers: 235 particular themes are listed in 13 groups of topics. Professor Kuczma when resignating in October, 1980, from his organizational duties at the University designated Professor Andrzej Smajdor to substitute him. In 1984 Professor Ger, being elected the chairman of the Chair of Functional Equations, conducted the Seminar for 16 years. After his resignation, since the elections in October, 2000, the Seminar is chaired by Professor Maciej Sablik.



In 1975, Marek Kuczma proposed to organize the *Contest for the Best Polish Paper on Functional Equations*, affiliated to the Seminar, cf. M. Sablik's article in [B10], 25-27. And from 1975, on the Jury of the Contest consisting of 13 members, being elected for two-years terms on special sessions of the Seminar, each year is estimating the papers published in the preceding year, authored or coauthored by a Polish mathematician. *Marek Kuczma Contest*, named after its founder who untimely died in 1991, belongs to those authorized and sponsored by the Rector of the Silesian University, and it is acknowledged by the Polish Mathematical Society. During 30 years of the existence of the Contest in its Jury acted 30 Polish mathematicians (see [B10], 29-30). More than 100 papers were awarded so far (for the complete list regarding the years 1974-2000 see [B10], 31-37).

**The 40th International Symposium on Functional Equations, 2002.**

Held from August 25 to September 1 at Gronów (cf. [B11]), it was organized by the University of Zielona Góra. The Scientific Committee consisted of Professor János Aczél (Waterloo, ON, Canada) as Honorary Chairman, Professor Jürg Rätz (Bern) as Chairman, and Professors Zoltán Daróczy (Debrecen), Roman Ger (Katowice), Ludwig Reich (Graz) and Abe Sklar (Chicago). The Organizing Committee consisted of Professors Witold Jarczyk and Janusz Matkowski and Dr. Dorota Krassowska who also acted as secretary of the symposium. There were 10 sponsoring institutions. The 60 participants came from 11 countries (26 from Poland).

There were 56 talks and 25 contributions in problems-and-remarks sessions. Professor Karol Baron presented a survey talk *Recent results in the theory of functional equations in a single variable*. The special session *Mean Values* organized by Zoltán Daróczy gave, in reports of 9 authors, an up-to-date overview of the theory of means (in particular, concerning the recently arisen Matkowski–Sutô problems). The ISFE medals for outstanding contributions to the meeting were awarded to Janusz Brzdęk and Tomasz Szostok.

**Katowice-Debrecen Winter Seminars on Functional Equations, 2001, 2003, 2005.** These are annual meetings of two schools on functional equations: from the University of Debrecen and from the Silesian University of Katowice. The first Seminar was held in Cieszyn, from February 7 to 10, 2001, the third and the fifth took place at Będlewo, from January 29 to February 1, 2003, and from February 2 to February 5, 2005, respectively. The other two Seminars, in 2002 and 2004, were held in Hungary. On each meeting the same number of participants from each city were present, altogether 20 researchers both on the first and on the second meetings, and 24 on each of the others.

The leaders of the native groups of participants, and the main organizers of each of the five Seminars, were Professors Zsolt Páles (Debrecen) and Roman Ger (Katowice).

## 8. Complementary remarks

The 11th International Conference on Functional Equations and Inequalities is planned to be held at Będlewo in September 2006. There was constituted its Scientific Committee, the members of which are Professors: Nicole Brillouët-Belluot (Nantes, France), Dobiesław Brydak (Kraków, Honorary Chairman), Janusz Brzdęk (Kraków, Chairman), Bogdan Choczewski (Kraków), Roman Ger (Katowice), Hans-Heinrich Kairies (Clausthal-Zellerfeld, Germany), László Losonczy (Debrecen, Hungary), Marek Cezary Zdun (Kraków) and Dr. Jacek Chmieliński (Kraków, Secretary).

The Organizing Committee of the 11th ICFEI consists of: Professor Janusz Brzdęk (Chairman), Dr. Paweł Solarz, Miss Janina Wiercioch and Mr Władysław Wilk.

The Scientific Committee of the International Symposia on Functional Equations, now chaired by Professor Roman Ger, gratefully accepted the declaration of Professor Kazimierz Nikodem, so that the 45th ISFE in 2007 will be organized for the fourth time in Poland, by the colleagues from the Technical-Humanistic Academy of Bielsko-Biała.

On Tuesday, December 6, 2005, the 1100th session of the *Seminar on Functional Equations* was held at 4.15 pm., as usual, in the Institute of Mathematics of the Silesian University of Katowice. Noteworthy is the fact that at the Institute there are also working two other seminars on functional equations: *The Seminar on Functional Equations and Inequalities in Several Variables*, conducted by Professor Roman Ger, and *The Seminar on Real Analysis*, conducted by Professor Karol Baron. The first seminar already celebrated its 600th, the second one – 500th session.

To complete the picture, let us note that regular seminars on functional equations and related topics are acting in Poland (and are chaired by the Professor(s)) at the: Silesian University of Technology in Gliwice (Stefan Czerwik and Wilhelmina Smajdor), Technical-Humanistic Academy of Bielsko-Biała (Kazimierz Nikodem), University of Rzeszów (Stanisław Midura and Józef Tabor), University of Zielona Góra (Witold Jarczyk and Janusz Matkowski).

What concerns the Kraków school of functional equations, a “Sister Seminar” with Kuczma’s one in Katowice started its work in 1970 at the AGH University of Science and Technology, under direction of Professors Bogdan Choczewski and Zenon Moszner. It reached about 750 sessions, is since 1994 affiliated to the Institute of Mathematics of the Pedagogical University of Kraków, and since October, 2005, it is managed by Professor Janusz Brzdęk. At the University two other relevant seminars are acting, *The Seminar on Multifunctions* (Andrzej Smajdor) and *The Seminar on Iteration Theory* (Marek Cezary Zdun).

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