PROFESSOR MIHAIL POPA – 70TH ANNIVERSARY

Professor Mihail Popa is a Moldavian mathematician and a remarkable leader of the Moldavian school of differential equations, who contributed a lot to the qualitative theory of differential equations and to the education of new generations of highly-qualified specialists. Professor Mihail Popa is Habilitated Doctor in Mathematical and Physical Sciences and Full University Professor. On May 15th 2018, Professor Mihail Popa will celebrate his 70th anniversary.

Mihail Popa was born in the village Vălcineț of the Călărași District, Republic of Moldova. In 1963, he graduated from the elementary school of the village Temeleuți, Călărași District; in 1966 he finished the secondary school nr.1 of the city Călărași and in 1971 he graduated from the Faculty of Physics and Mathematics of the State University of Chișinău. In 1978, he started his Candidate's Degree (1st PhD equivalent) (at Institute of Mathematics and Computer Sciences of the Academy of Sciences of Moldova (specialty 01.01.02 – Differential Equations).

In 1979, Mihail Popa defended his Candidate's Degree thesis in Mathematical and Physical Sciences at Gorki State University. He did it under the supervision of the well-known mathematician Academician Constantin Sibirschi. In 1992, he defended his Habilitated Doctor's degree thesis (2nd PhD thesis) in Kiev at the Institute of Mathematics of the Ukrainian Academy of Sciences.

The professional activity of Professor Mihail Popa took place at the Institute of Mathematics and Informatics of the Academy of Sciences of Moldova and it evolved as follows: Collaborator of the Laboratory (1975 – 1977), Scientific Researcher (1977 – 1980), Scientific Secretary (1980 - 1999), Deputy Director (1999 – 2006), Director (2006-2010), Scientific Principal Researcher (2010 - present).

The scientific interests of Professor Popa involve the use of invariant processes in the qualitative study of differential equations. A new viewpoint on the qualitative theory of differential equations based on the method of algebraic invariants founded by the Academician C. Sibirschi was established. This new viewpoint consists in application of the Lie algebras of operators of representations of the linear groups in the space of coefficients of systems of polynomial differential equations and of the graduate algebras of invariants and comitants to the geometry of these systems. This new viewpoint extended the scientific domain where it was applied, thus, to comprise methods of group analysis. This brought forth the study of the graduate algebras of invariants of differential equations with the help of generating functions and of Hilbert series. A sequence of generating series and of Hilbert series for diverse graduate algebras of comitants and invariants of differential systems was obtained for which it is possible to evaluate their Krull dimension.

A substantial part of the results are about the study of the Lie algebra of operators L4 for the center-affine group and its representations in the space of coefficients of autonomous systems of polynomial ordinary differential equations (S.O.D.E) of first order. Another category of results is connected to the classification of the dimensions of orbits of polynomial S.O.D.E with respect to the admissible groups. A new direction in the use of Lie algebras and of algebras of invariants is the extension to autonomous multidimensional systems of first order differential equations with polynomial right-hand sides, which have constant coefficients.

In his works Professor Popa used Lie L4 algebra and the Sibirsky's graduate algebras of the invariants and thus, a numerical estimation of the maximum margin of the maximum number of algebraically independent focal lengths was obtained. Professor Popa solved the Problem of the Center and Focal Center formulated by Henri Poincare over 130 years ago with help of the above-mentioned results for any two-dimensional differential system with polynomial nonlinearities.

Professor Mihail Popa is the author of over 120 scientific publications, among them four monographs on applications of algebras to systems of differential equations, two text books for Master's Degree students on Lie algebras and systems of differential equations and three books to popularize science.

The scientific activity of Professor Mihail Popa was highly appreciated by the scholars from many Scientific Centers, as the Université de Limoges (France), the State University of Minsk (Belarus), the University of Pitești (România), the Center of Research in Mathematics of Montreal (Canada), the University of Lund (Sweden), the Institute of Mathematics of the Romanian Academy of Science (București), the State University M. Lomonosov of Moscow, etc.

At Scientific Symposium dedicated to 70-anniversary of Professor Mihail Popa, held on 16 May 2018. On this occasion, the following letter was received and signed by the scholars of the Department of Mathematics of University of Barcelona, Spain:

We are a group of four scholars, J.C. Artes (Universitat Autonoma de Barcelona), J. Llibre (Universitat Autonoma de Barcelona), D. Schlomiuk (University de Montreal) and N. Vulpe (Institute of Mathematics and Computer Science, Moldova) who know personally Professor Popa whom we met either in Chișinău or in Montreal and we all value his work in the development of the invariant theory of differential equations, founded in Moldova by academician C.S. Sibirschi.

The four of us work on a long term project based on the results obtained by the Moldavian school in the invariant theory of differential equations.

Professor M. Popa is a brilliant disciple of C.S. Sibirschi and his work introduced a new viewpoint in the method of invariant theory, by using Lie algebras and differential operators for constructing new invariant polynomials and applying them in the qualitative study of differential equations. During the period 1998 - 2014 Professor M. Popa has been the scientific advisor of nine young mathematicians who obtained their doctorate under his supervision and he continues to form other young mathematicians. Thus, he is a leading member of the Moldavian school in mathematics.

On the occasion of his 70th birthday we congratulate Professor M. Popa on his achievements and we wish him good health and many more contributions in mathematics.

The contribution of Professor Mihail Popa to the education of new generations of highly-qualified mathematicians is enormous. From the year 1996 he works fruitfully at Tiraspol State University, where he won by competition the position of Full Professor and holds lectures for students, master students and PhD students. He was appointed as a scientific adviser of thesis for several university's graduates and master degree students. He is an exemplary figure and exceptional teacher who is inspiring his colleagues and former students in the best possible way in math and in real life.

It is one of the founders of the Seminar on Differential Equations and Algebras at Tiraspol State University, which works on regular basis since 2002 and it is designed for students, Master degree students, PhD students and scientific researches. Professor Mihail Popa has been a supervisor for ten defended PhD thesis; eight PhD graduates studied at Tiraspol State University (in Chișinău).

From February to June 2001, Mihail Popa was Invited Professor at the Université de Limoges (France), where he gave courses and seminars for students and professors.

Professor Mihail Popa was a director for many scientific projects, *in particular: the Workshop*" Qualitative Study of Differential Equations" (Chișinău, February 14-15, 2003), Second Conference of the Mathematical Society of Moldova, (Chișinău, August 17-19, 2004), International Conference „Algebraic Systems and their Applications to Differential Equations and to other mathematical domains" (Chișinău, August 21-23, 2007). He is a member of the Scientific Committee of the Institute of Mathematics and Informatics, a member of the Commission of Experts of the National Council of Accreditations and Attestation of the Republic of Moldova, a member of the Editorial

Boards of the Bulletin of the Academy of Sciences in Mathematics (Moldova) and of ROMAI Journal (Romania).

Professor Mihail Popa was awarded of Doctor Honorius Causa Degree of Tiraspol State University (2013), the Academy of Sciences of Moldova Award (2003), the ”Academician Constantin Sibirschi” Award (2004).

At the age of 70, full of vigor and optimism, Professor Mihail Popa is very active in the academic community of the Republic of Moldova. We wish him a good health, prosperity and new accomplishments in his scientific and didactic activities:

”Happy Birthday to You, Many Happy returns of the Day”.

The present volume is dedicated to Professor Mihail Popa and contains a part of communications presented at the Scientific Symposium dedicated to 70-anniversary of Professor Mihail Popa, held on 16 May 2018.

The more complete description of the life of Professor Mihail Popa and his scientific works can be found in the following publications:

1. M. Ciobanu, T. Rotaru. *130 years of the effort in the solving of the Poincaré center-focus problem*. Akademos 2013, no. 3, 13-21. (in Romanian)
2. M. Popa. *My way in mathematics*. Academy of Scenice of Moldova. Chișinău, 2018, 343 p. (in Romanian)
3. M.N. Popa, V.V. Pricop. *The center-focus problem: algebraic solutions and hypotheses*. Academy of Scenice of Moldova. Chișinău, 2018, 240 p. (in Russian)
4. M. Popa, V. Repeșco. *Lie algebras and dynamical systems in the plane*. Tiraspol State University. Chișinău, 2016, 237 p. (in Romanian)
5. M.N. Popa. *Invariant processes to differential systems and their applications in the qualitative theory.* Academy of Scenice of Moldova, 2014, 223 p. (in Russian)
6. M. Popa and T. Rotaru editors. *Academician Vladimir Andrunachievici.* Academy of Scenice of Moldova, 2009, 269 p. (in Romanian)
7. M.N. Popa. *Lie algebras and differential systems*. Academy of Scenice of Moldova, 2008, 163 p. (in Romanian)
8. M. Popa and T. Rotaru editors. *Institute of Mathematics and Informatics.* Academy of Scenice of Moldova, 2004, 454 p. (in Romanian)
9. M.N. Popa. *Algebraic methods for differential syst*ems. Flower Power edition. University of Pitești, Applied and Industrial Mathematical series, no. 15, 2004, 340 p. (in Romanian)
10. M.N. Popa. *Applications of algebras to differential systems*. Academy of Science of Moldova, Chișinău, 2001, 224 p. (in Russian)

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