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PROFESSOR RADU ROSCA AT HIS 90-th BIRTHDAY

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The Romanian School of Mathematics is pleased to praise Professor dr. Radu Rosca on the occasion of his 90-th birthday, together with distinguished words of appreciation and esteem for his tireless work, passion and abnegation demonstrated during 70 years devoted to mathematical research and human dignity. There is a solemn moment, required by the duty of honour to praise a full activity made with wisdom and competence in the benefit of the development of Mathematics and of human culture in general.

Professor Radu Rosca has worked continously for the promotion of creative studies in Geometry and has directed a multitude of young researchers from many countries in this field, willing to reach the top of this arid, but splendid branch of Science. Professor Radu Rosca is a specialist in Differential Geometry whose manifold original contribution to this field of central importance in pure and applied Mathematics gained him the highest international respect.

Radu Rosca was born on 15 Nov.1909, in Eliza-Stoeneşti (district of Ialomiţa, Romania). He has done secondary studies at Bucharest and studied also at the "Louis Le Grand High School" at Paris. He graduated from the University of Bucharest (Faculty of Sciences, Department of Mathematics) in 1934.

Radu Rosca started his teaching activities as an assistant of Professor Simion Stoilow at the Department of Mathematics at the University of Bucharest. He did post-graduate studies in Statistics and obtained the Doctor Degree of the Institute of Statistics at Paris in 1938.

The first results of Professor Radu Rosca in Differential Geometry were included in his Ph.D. thesis, defended in 1939 at the Sorbonne, under the supervision of the distinguished French mathematician Elie Cartan, the other members of the jury being the Professors G. Darmois, B. Gambier and H. Villat. The title of the main thesis was "Asymptotic transformations of curves in elliptic spaces". The title of the additional thesis was "Characteristic functions in Probability Theory". Some results from the main thesis were published in a note in the "Comptes Rendues de l'Académie des Sciences de Paris". In the preface of his doctoral thesis, the author expressed his indebtedness to Professor G. Tzitzeica, whose work largely had influenced Radu Rosca to dedicate himself to Differential Geometry.

The remarkable results and the appreciation of Elie Cartan towards him, brought Radu Rosca at once a large international recognition. Moreover, the Ph.D. degree permitted Radu Rosca to become an Associate-Professor at the Polytechnical University of Bucharest in 1939.

Until the 50-ies, he published a series of papers on the theory of congruences and projective nets in the sense of Goursat, Ribaucour, Guichard, Eisenhart, Tzitzeica, Bianchi, Calapso, etc., which prove important backgrounds in projective and metric Differential Geometry. The theory of the congruences of Goursat, Ribaucour and Guichard, and the Moutard and Bäcklund transformations were applied by Radu Rosca to the elliptic spaces, which combine in some sense both the projective and the metric aspects of Differential Geometry.

After 13 painful years of political prison (1951-1964; he was rehabilitated in 1975), in 1964 he became the Head of the Department of Geometry at the Institute of Mathematics at Bucharest of the Romanian Academy. It is truly impressive to see that after such a long break of any contacts with the scientific world, Professor Radu Rosca has succeeded to develop again such an intense scientific activity at such a high level. The results of his scientific work since then are concretised in some 250 research articles which, on the one hand have continued the topics from the period of his doctoral studies, and, on the other hand also dealt with many new topics, mainly on the geometry of pseudo-Riemannian spaces, in particular Minkowski spaces, and the geometry of various types of structured manifolds carrying specific vector fields.

The papers published by Radu Rosca until the 70-ies can be classified in the following groups:

- papers on isotropic curves, helicoïds of minimum area and congruences of spheres centered on isotropic developable surfaces, Lie-Ribaucour surfaces;
- papers on Ribaucour-Vincensini congruences;
- papers on classical topics in projective Differential Geometry: Godeaux surfaces, Wilczinski quadrilaterals, etc..

In 1969 he has published in Bucharest the book "Differential Geometry of Congruences in Elliptic Spaces" [Ed. Academiei Române]. It uses essentially as methods of research the theory of moving frames and the theory of exterior differential systems of Elie Cartan.

Starting 1970 he devoted much attention to pseudo-Riemannian spaces, and, in particular, to Minkowski spaces. We want to remark his contribution to the International Congress of Mathematics at Nice (1970) on isotropic hypersurfaces. The isotropic manifolds appear as submanifolds of pseudo-Riemannian manifolds and also play an important role in Relativity. Professor Radu Rosca has introduced moreover the so-called pseudo-isotropic submanifolds [Comptes Rendues Acad. Sci. Paris, 1970], which have interesting geometric properties and are also important by their applications. In this period, he wrote amongst others the books "Isotropic and Pseudo-isotropic Manifolds of a Relativistic Manifold" [Ed. Academiei Române, 1972] and "Introduction in Relativity and Pseudo-Riemannian Geometry" (with G. Vrănceanu) [Ed. Academiei Române, 1976], which offer a systematic presentation of many of the results of his personal research in these fields

Since then, besides continuing research in connection with the previous subjects, Radu Rosca devoted much time of research to manifolds which carry special geometric structures, which basically extend Kaehler and Sasakian geometries, and to manifolds which admit special types of vector fields.

Among the remarkable results obtained with respect to the first mentioned field of study, we want to quote, in particular:

- his papers on improper immersions in pseudo-Riemannian manifolds;
- his introduction, amongst others, of the notions of quasi-minimal submanifolds and of $CIC'R$-submanifolds (coisotropic CR-submanifolds);
- his papers on the geometry of (co)symplectic and quantic manifolds;
- a series of papers on para-Kaehlerian and para-coKaehlerian manifolds and on Sasakian and para-Sasakian manifolds.

Concerning manifolds M endowed with certain G-structures, he has also published articles on mechanical systems (in the sense of J. Klein) and on some differential geometric structures induced

on the tangent bundle TM.

With respect to the second mentioned field of study, i.e. in the study of the Differential Geometry of vector fields on pseudo-Riemannian manifolds, Radu Rosca has introduced the notions of exterior concurrent vector fields of order r, skew-symmetric Killing vector fields, structure vector fields on almost contact and almost paracontact manifolds, and has studied certain framed manifolds, starting from the f-structures introduced by K. Yano. Some results on the Differential Geometry of vector fields on pseudo-Riemannian manifolds were published in the monograph "Some Aspects of the Differential Geometry of Vector Fields", written in co-operation with I. Mihai and L. Verstraelen [PADGE, KU Leuven, KU. Brussel, 1996].

The large number of the papers recently published in a variety of international mathematical journals prove that Professor Radu Rosca remains a very active research mathematician, exceptionally inspired and a brilliant example for the present and future generations of researchers.

As a recognition of his merits, he was invited to deliver lectures at many international conferences and congresses and to hold Professorships at many universities and research institutions all over the world: in Europe, a.o., at Collège de France (Paris), Marseille, Lille, Toulouse, Moscow, Messina, Palermo, London, Durham, Bonn, Hamburg, Hannover, Münich, Oberwolfach, Madrid, Salamanca, Brussels, Leuven, and in the USA, a.o. in Texas, North Carolina and New Jersey.

On the occasion of his 80-th birthday, the KU Leuven and KU Brussel organised an international conference on pure and applied Differential Geometry in honour of Professor Radu Rosca, where also several of his students and coworkers participated; in particular: K. Buchner, F. Dillen, J.M. Morvan, M. Petrovic, B. Rouxel, I. Van de Woestijne, L. Verstraelen, L. Vrancken and G. Zafindratafa. The proceedings of this meeting were published by the KU Leuven's Department of Mathematics, starting with the texts of K. Buchner and B. Rouxel offering general discussions of the life and work of Professor Radu Rosca.

We want to mention the following honorary degrees awarded to Professor Radu Rosca: Docent Doctor of the University of Bucharest, member of the "Accademia Peloritana" at Messina, member of the Belgian Royal Academy of Sciences, member of the Einstein Foundation, "Professor Honoris Causa" of the University of Bucharest and of the International Sophus Lie Centre (which is sponsored by UNESCO), "Doctor Honoris Causa" of the Polytechnical University of Bucharest and laureate of the Gold Medal of the City of Paris. His personality is presented in ten "Who's Who" dictionaries, for instance "Who's Who in the World" - 1999.

Professor Radu Rosca has effectively co-operated in research with over thirty mathematicians from Western and Central Europe, the USA and Japan. And, in particular, he has joint publications with a.o. the following Romanian mathematicians G. Vrănceanu, R. Miron, L. Nicolescu, R. Iordănescu and I. Mihai. Also, by useful discussions, he directed Liviu Nicolescu to apply the geometry of deformation algebras in Relativity. He was a member of the jury for the Ph.D. thesis of Ion Mihai at the Katholieke Universiteit Leuven, the supervisor being Leopold Verstraelen, whose own doctoral research concerned pseudo-isotropic submanifolds and was started in 1971 at Bucharest under the guidance of Professor Rosca at the Institute of Mathematics of the Romanian Academy.

On behalf of the Department of Geometry from the Faculty of Mathematics at the University of Bucharest, on the occasion of his birthday, we want sincerely to congratulate Professor Radu Rosca and to express our deep appreciation and esteem, and to wish him a good health and long life, enlightened with new results in his research work in Differential Geometry.