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Zdeněk Vančura

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NEWS and NOTICES

IN MEMORIAM PROFESSOR ALOIS URBAN

ZDENĚK VANČURA, Praha

On Friday, January 9, 1981, a prominent Czech specialist in geometry Professor Alois Urban died in Prague at the age of 68 years.

Professor RNDr. Alois Urban was born in Ústí nad Orlicí in Eastern Bohemia. Both his talent and interest brought him to the Faculty of Science of Charles University in Prague, where he studied Mathematics and Descriptive Geometry. He graduated with honours in 1935 and received his Doctor's (RNDr.) degree in 1937 on the basis of his dissertation "Le complexe de normales de V_2 dans V_4".

Having difficulties with finding a teaching job, he worked in 1935–36 as scientific assistent at the Institute of Mathematics of the School of Special Sciences in Prague. From January 1937 he was teacher of Mathematics and Descriptive Geometry at secondary technical schools at Prague and Liberec (Northern Bohemia). In 1942, the Nazi occupants sent him, on the basis of their "Total-Einsatz" principle, as an instructor of apprentices to a Prague factory; actually, he acted here as teacher of Mathematics and Descriptive Geometry till the end of the World War II, teaching at the same time at the Evening Technical School for workers.

During the years 1945–50 he was regularly relieved of his duties as teacher of the secondary school and worked as Demonstrator at the Faculty of Science of Charles University, being appointed Assistent Professor in 1950. During these years he also lectured at the Schools of Forest, Mechanical and Electrical Engineering.

In the year 1948, A. Urban worked very intensively and successfully during his six-month scholarship at one of the prominent personalities of modern differential geometry, Prof. J. A. Schouten in Epe (Netherlands). In 1951 he was appointed Associated Professor and in 1954 Full Professor of Descriptive Geometry at the Czech Technical University at Prague.

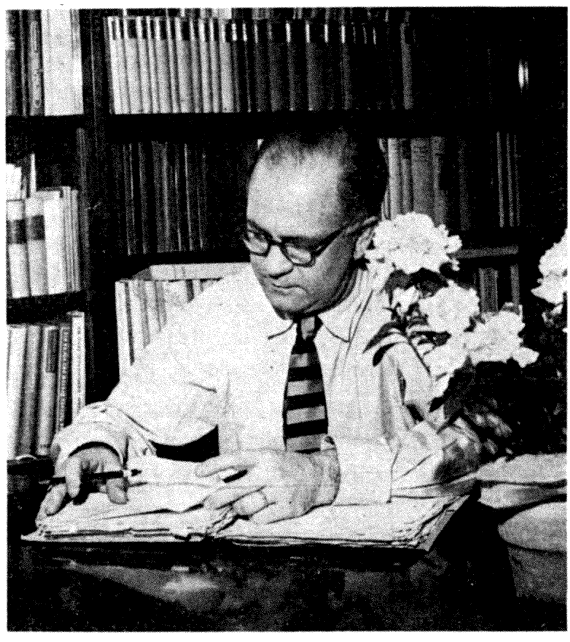
Professor Urban held a number of offices at the Faculty of Mechanical Engineering. Among other, he was Head of Department of Mathematics and Descriptive Geometry during the years 1954–60, member of the Scientific Board of the Faculty and its Vice-Dean in the years 1953–55. In 1979, the state of his health forced him to retire.

For his outstanding work in science as well as in education and organization, his

devoted efforts and extraordinary merits he was awarded a number of distinctions and memorial medals.

The field of main scientific interest of Professor Urban was the differential and descriptive geometry. He published about sixty papers, textbooks and lecture notes.

The original scientific papers of Prof. Urban (see the list at the end of this note),



except [18] and [19], which are devoted to classical problems from the theory of cone sections, and [20], which deals with double-net projection, belong to certain significant branches of differential geometry: the papers [1] to [11] to the domain characterized by some works of V. Hlavatý and J. A. Schouten, the papers [12] to [17] to that characterized by some works of E. Čech.

Urban's works can be classified into several groups:

The papers [8] and [9] belong to the differential geometry of curves and surfaces in the three-dimensional space R_3. In [8] it is shown that at an ordinary parabolic point of a surface, relations analogous to Bonnet's formula and Beltrami's theorem hold (the original relations hold at hyperbolic points of a surface between the geodetic curvature of the asymptotic curve and the curvatures of the curve which has both the tangent and the osculating plane in common with the asymptotic curve). In [9], properties of the so-called second vector of curvature common to all the curves of a surface with a common tangent are studied. In particular, Codazzi's scalar, which is

closely connected with the second vector of curvature, is geometrically interpreted.

The paper [2] completes the results concerning Frenet's formulate of undevelopable line surfaces (presented by V. Hlavatý) in the cases when the axes of the osculating linear congruence of the surface along its straight line do not have contact of the same order with the surface.

The papers [1], [3], [4], [5] belong to the theory of Riemann spaces. In [1], which presents a brief account of the author's unpublished dissertation, Urban established an important generalization of Hlavatý's results on the complexes of normals V_2 in R_4, which is essentially based on the geometric interpretation of suitable tensors connected with V_2 in V_4. The paper [3] solves the problem to determine the differential equation of curves of such V_{n-1} in V_n, whose all points are umbilical. The papers [4] and [5] represent essentially an original geometrical interpretation of the vector density $\mathfrak{N}^i = \mathfrak{a} a^{ij} K_j$ of weight 2 introduced by T. Y. Thomas, where a^{ij} are contravariant components of the fundamental tensor of the Riemann space, $\mathfrak{a} = \det(a_{ij})$ and K_j are the derivatives of the Gauss curvature K. In [5] the author found the relation between the above mentioned density and the tensor of curvature of the two-dimensional projective Riemann space, while in [4] he introduced in the two-dimensional Riemann space the scalar density $\gamma = \mathfrak{N}^i \mathfrak{N}^j \nabla_i M_j$ of weight 5 ($\mathscr{M}_j = K_m a_{ij} \mathfrak{E}^{mi}$, $\mathfrak{E}^{mi}$ is the bivector density of weight 1 with components $\mathfrak{E}^{11} = \mathfrak{E}^{22} = 0$, $-\mathfrak{E}^{12} = \mathfrak{E}^{21} = 1$) as a geodetic invariant whose nullity on V_2 (for $K \neq \text{const}$) is equivalent to the requirement that the orthogonal trajectories of the curves $K = \text{const}$ be geodetic curves.

The papers [6], [7], [10] deal with more general connections. The first two study the geometry of the completely integrable system of linear partial differential equations of the second order $\partial^2_{ij} z = \Gamma^k_{ij} \partial_k z + \Gamma_{ij} z$. In terms of its coefficients, the system is assigned an $(n+1)$-dimensional space A_{n+1} with a projective connection, such that every solution of the system represents a geodetic hypersurface of the space A_{n+1}. Geometric methods are then used to construct Bianchi's conjugate system to the given system of differential equations. In [10] it is shown that the so-called U-space, introduced by S. I. Husain in his theory of the universal gravitation and electromagnetic field, is semimetrical and semisymmetrical. At the same time, some more detailed properties of the connections of this type are derived.

The paper [11] concerns the theory of geometric objects and presents necessary and sufficient conditions for certain geometrical objects of the r-th class (the number of components coincides with the dimension of the space) to be equivalent.

The papers [12] to [17] belong to the classical differential projective geometry. They study both the theory and applications of increasing the order of contact of curves by their projection. Among them, the crucial position is held by [14], which brings an important generalization of a theorem on contact due to E. Čech, providing a necessary and sufficient condition for two curves with contact of order $s-1$ at their common point to have there the actual contact of the order $s + \sigma - 1$, $1 \leqq \sigma \leqq s$ (s, σ positive integers). The generalization consists in deleting the restrictive assumption just

mentioned. The more general theorem enabled the author to construct geometrically main planes, lines and points from which the given curves can be projected into curves with higher contact than the original ones, even for the case $s = 1$, i.e. for a pair of intersecting curves (which is, as can be shown both analytically and geometrically, the case more difficult than $s > 1$).

The problems concerning the increasing of contact of curves by projecting, as well as the problems of double-net projections, remained the centre of the scientific interest of Prof. Urban till the end of his life.

Professor Urban used his deep and wide knowledge as well as his versatile experience in teaching in a number of popularizing articles from Mathematics, Descriptive Geometry and their history as well as in a number of textbooks and lecture notes in Geometry and Descriptive Geometry, which appeared in several editions and considerably influenced the education in Descriptive Geometry of the students of Mechanical Engineering. His textbook "Descriptive Geometry I, II" was awarded a prize by the Ministry of Education in 1978.

Professor Urban led a team of researchers working on the project "Mathematical methods in Descriptive Geometry" and cooperated with various institutions of applied research. He was member of Editorial Boards of several scientific and popularizing journals, devoted organizer of the congresses of Czechoslovak mathematicians and of specialized conferences, active member and officer of the Society of the Czechoslovak Mathematicians and Physicists. For his merits he was elected honorary member of the Society in 1975.

Professor Urban was an honest man of excellent character. All his friends, colleagues and students will remember him with respect and esteem.

LIST OF SCIENTIFIC PAPERS OF PROFESSOR A. URBAN

[1] Le complexe de V_2 dans V_4. Spisy přírod. fakulty KU, Praha 1937.

[2] Frenet's formulae of undevelopable line surfaces (Czech; German summary). Rozpravy II. tř. Čes. Akademie, *LII* (1942).

[3] The differential equation of curves on a special V_{n-1} on V_n (Czech; French summary). Rozpravy II. tř. Čes. Akademie, *LVII* (1947).

[4] On the geodesic representation between twodimensional Riemannian spaces. Proceedings can koninklijke Nederlandsche Akademie van Wetenschappen, *LI* (1948).

[5] Note on the T. Y. Thomas's paper: On the projective theory of two dimensional Riemann spaces. Čas. pěst. mat. a fys., *73* (1948).

[6] On the geometry of a system of partial differential equations of the second order. Proceedings van koninklijke Nederlandsche Akademie van Wetenschappen, *LII* (1949).

[7] Geometrization of a certain system of partial differential equations of the second order (Czech). Čas. pěst. mat. a fys., *74* (1950).

[8] Beltrami's theorem for parabolic points of a surface (Czech). Čas. pěst. mat., *77* (1952).

[9] The second figure of curvature of a surface in R_3. Čas. pěst. mat., *78* (1953).

[10] On space of an unified field theory of gravitation and electromagnetism. Tensor (New Series), *9* (1959).
[11] Sur l'équivalence de certains objects géometriques de $r^{ième}$ classe. Tensor (New Series), *13* (1963).
[12] On the contact of curves in the projective space (Czech). Čas. pěst. mat., *81* (1956).
[13] Contact of curves in the projective space. In: Věstník 1. vědecké konference ČVUT, fak. stroj. inž. 1955, SNTL 1956, Praha.
[14] Théorème fondamental de la théorie du contact des courbes. Czech. Math. J., *7* (*82*), (1957).
[15] Increasing the contact of curves by projecting. Matematicko-fyzikálny časopis SAV, *VII* (1957).
[16] Increasing the contact of curves by projecting. The case of intersecting curves in the three-dimensional space (Czech). In: Sborník II. vědecké konference ČVUT, fak. stroj. inž., SNTL 1958, Praha.
[17] Elementary spatial determination of osculating circles of cone sections I (Czech). Matematicko-fyzikálny časopis SAV, *15* (1965).
[18] A generalization of normals of cone sections. Rozhledy matematicko-přírodov., *23* (1943/44).
[19] The set of centres of similar cone sections in the net of similar cone sections (Czech). Čas. pěst. mat. a fys., *72* (1947).
[20] Double net projection to one plane with reduced basis (Czech). Acta polytechnica, Práce ČVUT v Praze, (1974).