Jan Sobotka (1862–1931)

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Summary

RESUMÉ

Life and Work of Jan Sobotka

Jan Sobotka was born on September 2nd, 1862 in Řepníky near Vysoké Mýto in the family of a tailor and cottier Josef Sobotka. He got secondary education at *Realschule*[1] with German tutorial language in Prague. There he was probably greatly influenced by his professor of mathematics Emanuel Czuber (1851–1925).

In 1881, he entered the Czech Technical University in Prague where he attended lecture courses by G. Blažek (1842–1910), F. Tilšer (1825–1913), Ed. Weyr (1852–1903), A. Pánek (1843–1908) and others. J. Sobotka enroled also to the Czech Charles-Ferdinand University as an extraordinary student. There he studied mathematics under the lead of F. J. Studnička (1836–1903). In 1887, he passed teacher examinations in mathematics and descriptive geometry. From 1886 till 1891, he worked as an assistant of F. Tilšer at the Czech Technical University. At the same time, from 1887/88 till 1890/91, he taught measuration and drawing at *průmyslová škola*.[2]

After his marriage with Rosa von Helminger in 1891, J. Sobotka left for the Technical University in Zürich where he attended courses of W. Fiedler (1832–1912), K. W. Ritter (1847–1906), A. Fliegner (1842–1928) and M. Disteli (1862–1923). After returning from Switzerland he stood in for F. Tilšer at the Czech Technical University in the school year 1892/93. His daughter Růžena was born in Prague on November 14th 1893. J. Sobotka spent the school year of 1893/94 abroad too. He became an ordinary student of the university in Breslau, where he was especially interested in R. Sturm's (1841–1911) courses on geometry. Both his foreign studies were defrayed thanks to the Gerstner's scholarship fund.

In 1894, J. Sobotka moved with his family to Vienna and passed a teacher examination, which enabled him to teach at *Realschule* in German. He taught geometry, drawing and free-hand drawing at Viennese *Realschule* from the beginning of the school year 1894/95 till February 1897. Sobotka's family grew by the birth of his son Erich in March 1895. In 1896, J. Sobotka was appointed an assistant of G. A. Peschka (1830–1903) at the Vienna Technical University. In the following year, he filled the second chair of descriptive geometry as an extraordinary professor of descriptive geometry, projective geometry and graphical computation.

In 1899, the Czech Technical University was established in Brno. J. Sobotka became its first full professor of descriptive geometry. He lectured descriptive geometry (4 lessons in winter semester, 6 lessons in summer semester or conversely) and drawing (later training on descriptive geometry, 6 lesson both

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[1] The Realschule was a type of secondary school in Austria, which offered more science than the grammar school (*Gymnasium*).

[2] A still existing type of secondary school giving especially technical education.

in winter and summer semester) five study years. Its subject was orthogonal, oblique, central projection, axonometry, construction of important curves and surfaces. In the winter semester 1900/01, he gave an extra course on *A Theory of a Projection of the Earth's Surface*. He built up the institute of descriptive geometry, founded a library and a collection of models. He was twice elected to be the dean of the building department.

In 1904, J. Sobotka was appointed a full professor of mathematics at the Faculty of Arts of the Czech Charles-Ferdinand University in Prague. He lead courses on descriptive, projective, differential and analytic geometry. He gave also many other lectures e. g. on spatial curves, surfaces of the second degree etc. Soon, he became an examiner for mathematics and descriptive geometry in the examinational commission for future teachers, director of mathematical seminary and proseminary together with K. Petr (1868–1950) and F. Koláček (1851–1913). In the school year 1906/07, he held an appointment as the dean of the Faculty of Arts. In 1908, he gained the honorary doctorate. After the foundation of the Faculty of Sciences in 1920, J. Sobotka became its professor of mathematics. He influenced a number of Czech mathematicians studying at university in the first half of the 20th century (e. g. E. Čech (1893–1960), V. Hlavatý (1894–1969), V. Jarník (1897–1970), V. Kořínek (1899–1981), M. Kössler (1884–1961), K. Rychlík (1885–1968), F. Vyčichlo (1905–1958)).

Jan Sobotka died of tuberculosis on May 10th 1931. In his memory the *Union of Czech Mathematicians* organized a solemn meeting which was held on December 10th 1931. His 100th birthday anniversary was commemorated in Řepníky by opening a memorial plaque.

Sobotka's Scientific Results and Their Acceptance

Jan Sobotka is an author of nearly 150 scientific articles, more than 50 reviews, almost 20 obituaries, one thorough and extensive textbook *Descriptive geometry of parallel projection* [S36] (XVIII + 634 pages with 471 figures) and three-part lithographied lectures on differential geometry [S41] (I., X + 543, II., VI + 484, III., VII + 506 pages).

Sobotka's scientific work was studied by a team of geometers lead by F. Vyčichlo (1905–1958) in the sixth decade of the 20th century. They divided it into four groups; treatises on descriptive geometry, articles devoted to differential geometry, papers on projective geometry and other, unclassifiable essays.

The most important are Sobotka's texts on descriptive geometry. These concern parallel projection (surfaces of the second degree), central projection (circle, sphere – *Remarks on Central Projection of Sphere* [S32], general curves), axonometry (*Axonometric Representation Given Two Projections* [S19], Pohlke-Schwarz's theorem – *Several Proofs and Constructions of Pohlke's Theorem* [S109], its proofs, oblique axonometry – *Contributions to Constructions in Oblique Axonometry* [S111]), construction of osculating surfaces, tangent surfaces of helicoid – *On Construction of Osculating Hyperboloid of Ruled Surfaces* [S38] and surfaces of revolution.

The subject of other papers is differential geometry. Those are devoted to e. g. a curvature of curves and surfaces – *On the Curvature of Algebraic Curves* [S87], *Properties of Curvature Radii of Conics* [S9], *Constructions Concerning the Curvature of a Surface at a Given Point* [S44], infinitesimal geometry of curves – *Contribution to Infinitesimal Geometry of Integral Curves* [S14], *On Infinitesimal Geometry of Plane Curves* [S15].

Further can be detached group of articles classifiable to projective geometry, e. g. *Remark to Biquadratic Involution* [S130], *Note on the Fundamental Relations of Projective Coordinates* [S148], *Consideration on Construction of Conics Given by Imaginary Points* [S37].

His results were cited by Czech (e. g. A. Pleskot (1866–1935), B. Procházka (1855–1934), J. Klíma (1887–1943), K. Havlíček (1913–1983)) and foreign geometers (G. Loria (1862–1954), E. Müller (1861–1927), F. J. Obenrauch (1853–1906), K. Doehlmann (1864–1926)).

Memberships in Scientific Societies

Since his studies, J. Sobotka was a member of the *Union of Czech Mathematicians.* He served as an accountant (1886/87), later as a recorder (1887–1891). In 1906, he became an honorary member, in 1908/09 a member of the committee, the following year a lifelong secretary, in 1927 a member of the presidential commission of the committee.

From 1900, he was a member of the *Royal Bohemian Society of Sciences.* He worked as a treasurer and co-operated in the commission for edition of Bolzano's life work.

In the same year, J. Sobotka became a member of the *Czech Academy of Sciences and Arts.* He read articles of young geometers, wrote reviews and texts for its journals *Discourses of the Czech Academy*[3] and *Bulletin International.* He was the first one who was awarded Adámek's price for his lifelong work in 1927.

J. Sobotka was also a member of *National Scholastic Court, International Mathematic Union* and *Yugoslav Academy of Sciences.*

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This monograph is devoted to the life and work of the Czech geometer Jan Sobotka (1862–1931). It consists of five chapters and extensive factual and illustrated appendices.

The life of Jan Sobotka is presented in the first chapter. It is divided into several paragraphs corresponding to the specific life time or functions, which he performed. This part is based on the study of archival sources deposited in Czech and Austrian archives, primary and secondary periodical and book publications.

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[3] In Czech *Rozpravy České akademie císaře Františka Josefa pro vědy, slovesnost a umění*, later *Rozpravy České akademie věd a umění.*

In the second chapter, there are described constructions of the line segments that approximately rectify a given circular arc or circle. We considered rectifications, which are discussed in Sobotka's textbook *Descriptive geometry of parallel projection* [S36] and some of those dealt by Czech mathematicians. Other constructions (d'Ocagne's, Rankine's, Specht's rectifications) are given for comparison made at the end of the chapter.

Z. Nádeník briefly points out main ways of Sobotka's work in the third chapter. Those are focal constructions of quadrics, Apollonius' problem, problem of normals to conics and descriptive geometry.

The fourth chapter is devoted to Sobotka's textbook *Descriptive geometry of parallel projection* [S36]. At first, Z. Nádeník writes about its repercussion in the Czech and foreign countries, compares it with foreign textbooks (e. g. W. Fiedler, *Die darstellende Geometrie in organischer Verbindung mit der Geometrie der Lage*, Leipzig, 2nd ed., 1875, G. Peschka, *Kotirte Ebenen (Kotirte Projektionen) und deren Anwendung*, Brno, 1877, A. Mannheim, *Cours de géométrie descriptive*, Paris, 1880) and evaluates it from the view of the first and the last decades of the 20th century. In the following text, he appreciates particular chapters of the textbook, adds notes and states analytically several expositions brought out by J. Sobotka synthetically.

Elementary constructions of axes of ellipse from its conjugate diameters are the subject of the fifth chapter. It includes 16 subsections. In the first one, there are derived fundamental analytic relations related to conjugate diameters. In the following ones are described constructions of different authors (Appolonius (about 262–190 B.C.), A. F. Frézier (1682–1773), L. Euler (1707–1783), M. Chasles (1793–1880), D. Rytz (1801–1868), M. Meyer (1824–1856), O. Broch (1818–1889), O. I. Somov (1815–1876), J. Steiner (1796–1863), A. Mannheim (1831–1906), C. Rodenberg (1851–1933), F. Graefe (1855–1918), K. Pelz (1845–1908) and J. Sobotka). Z. Nádeník gives proofs of constructions analytically. The chapter ends with the supplement devoted to the theorem of M. Chasles and the supplement about the three-dimensional analogy, i. e. construction of semi-axes of ellipsoid from its conjugate radii.

The factual appendices in the final part of the book comprise the list of publications of J. Sobotka complemented in some cases with url addresses of their digitalized versions, with references to reviews published in review sources released at that time.[4] Further they contain the outline of his teaching activities (at secondary schools, at the Czech Technical University in Prague, Vienna Technical University, Czech Technical University in Brno and Czech Charles-Ferdinand University (since 1920 Charles University) in Prague), the list of theses reviewed by J. Sobotka and the overview of Sobotka's studies at the Czech Technical University in Prague and the Czech Charles-Ferdinand University in Prague. Some of attainable copies of documents and photographs are presented in the illustrated appendices.

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[4] These are *Jahrbuch über die Fortschritte der Mathematik*, *Revue semestrielle des publications mathématiques*, *J. C. Poggendorff's biographisch-literarisches Handwörterbuch* and *Časopis pro pěstování mathematiky a fysiky*.