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DIGITIZED WORKS OF EMILIJAN JOSIMOVIĆ¹

Abstract. In this paper we present digitized works of Emilijan Josimović, a respectable 19th century Serbian architect, engineer and professor of mathematics. He is considered as a first Serbian urbanist and in the mid of the sixties of the XIX century he gave a plan pursuant to which the center of Belgrade is reconstructed. He also was the university professor of mathematics, rector of the Grand School, the forerunner of the Belgrade university. He wrote first Serbian university books in mathematics and architecture. It is interesting that the books he wrote in the fifties of the XIX century were written in the old-Serbian language and script. His later books were written in modern Serbian in accordance of Vuk Karadžić reform. We digitized six his works, four textbooks in mathematics, one textbook in physics and the proposal of the regulation plan of the city of Belgrade. The printed copies of these books belong to Serbian Academy of Sciences and Arts. Their digital copies are deposited in the Virtual Library of the Faculty of mathematics, elibrary.matf.bg.ac.rs.

Keywords: Emilijan Josimović, digitized works, XIX century.

Introduction

This paper belongs to the series of articles related to the digitization of distinguished former Serbian scientists and their digital legacies:

<http://legati.matf.bg.ac.rs>

<http://elibrary.matf.bg.ac.rs>

A group of participants of the Digitization project of the Faculty of Mathematics in Belgrade and the Mathematical Institute of the Serbian Academy of Sciences and Arts started in the first decade of this century to build a virtual library and a Digital Legacy, Internet sites of the Faculty of Mathematics. The general idea of these sites was to present biographies and works of the prominent Serbian scientists from the past whose opus was related in some way to mathematical sciences. We also wanted to have all their scientific and technical works and personal data in one place. These items include photos, letters and other related documents. We believe that these collections will help to better understand their work and life. We designed this Internet site bearing in mind the general audience, but the scientific community, too. Up to now, biographies of three scientists, academicians and the former professors of the Faculty of mathematics are offered there: Anton Bilimović (1879-1970), Bogdan Gavrilović (1864-1947) and Milutin Milanković (1879-1958). Recently, a preparation of digital legacy dedicated to Slaviša Prešić (1933-2008) was started (Mirjana Maljković and Biljana Stojanović). In

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this paper we present digitized works of Emilijan Josimović (1820? – 1897), who was a respectable 19th century Serbian architect, engineer and professor of mathematics.

Short biography of Emilijan Josimović

Emilijan Josimović (1820? – 1897) is considered as a first Serbian urbanist and in the mid of the sixties of the XIX century he gave a plan pursuant to which the center of Belgrade was reconstructed. He also was a university professor of mathematics and the rector of the Grand School, the high school that proceeded of the Belgrade University. It is not known for certain the year when he was born, but there are some evidences that he was born most probably in 1820 in Old Moldava. This settlement of now modern Romania lies on the left bank of the river Danube and it is known for a large Serbian minority in the past. He got his elementary and secondary education in Caransebeș and Lugoj (Romania). Afterwards he finished the Polytechnic school in Vienna. In the 1845 he came in Belgrade for a professor of architecture and mathematics at the Belgrade Liceum and other highest educational institutions in Serbia.

Not a known painted portrait or a photograph was left after him, even if he was a celebrity and photographing was widespread in his time. Most probably the reason for that is the following. After his coming to Serbia, he lived in a village of Poreč (now the town of Donji Milanovac). But his house was destroyed in 1942 during the great flood and most probably personal data regarding Emilijan Josimović were lost during this event. Even if he lived and worked in Belgrade, he did not have his own house there.

He had very important role in the urban planning and the reconstruction of Belgrade. In fact, he is most known for his contribution to the reconstruction of Belgrade in the mid of XIX century. He managed surveying Belgrade (1864-1867) and in 1867 published a proposal for the urban plan of Belgrade. This regulation plan of Belgrade was the most important Josimović work and a significant architectural and urban deed which laid in the foundation of urban planning in Serbia. For example, the famous and the most known Knez Mihailova street in the center of Belgrade got its today look in accordance to his plan. At the beginning of this street, there is a memorial devoted to him.

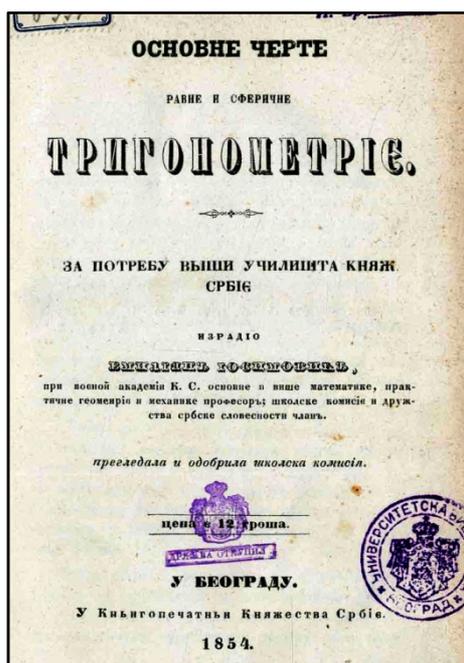
Since his coming to Serbia in 1845 until his retirement in 1878 he was the professor at the highest educational institutions in Serbia which were in this time concentrated in Belgrade. Firstly, he was appointed to the professor of mathematics at the Belgrade Liceum. After that, in 1850, he became a professor of mathematics, mechanics and geodesy at the Army artillery school (but he remained the honorary professor of Liceum). Finally, he was appointed to the professor of mathematics in Belgrade Grand School (1869) where he also was a rector (1876-1877). During his professorship he wrote first Serbian university books in mathematics and “applied geometry” how he used to call geodesy. It interesting that the books he wrote in the fifties of the XIX century were written in the old-Serbian language and script. His later books were written in modern Serbian in accordance of Vuk Karadžić linguistic reform.

He was also a member of the highest Serbian academic societies (“Društvo srbske slovesnosti” – Society of Serbian sciences, “Srpsko učeno društvo” – Serbian scientific society, etc) and the honorary member of the Serbian Academy of Science since its foundation (1886).

Digitized works of Emilijan Josimović

We digitized six works of Emilijan Josimović, four textbooks in mathematics, one textbook in physics and the proposal of the regulation plan of the city of Belgrade. The printed copies of these books belong to the Serbian Academy of Sciences and Arts and due to the courtesy of the Academy this digitization was possible. Digital copies of the books are deposited in the Virtual Library of the Faculty of mathematics, library.matf.bg.ac.rs. We present shortly the contents of the books.

Trigonometrija (1854) (Trigonometry)



Josimović wrote this book in old Serbian and published it in 1854. The book consists of three chapters and about 170 pages. At the end there are bibliography (German and French authors), a two page list of corrections and large table of figures.

The first part, *Goniometry*, explains the basic properties of trigonometric functions. The second one, *Plain trigonometry*, is devoted to the solving problems on triangles. There are also some applications in measuring in geodesy. The third chapter, *Spherical trigonometry*, is the largest, most advanced and the most interesting part of the book. Besides deriving and explaining notions and formulas from spherical trigonometry, he solves there a lot of problems related mainly to spherical triangles. There are also some applications to advanced problems of geodesy and astronomy.

This Josimović's book was not the first Serbian book on trigonometry. Atanasije Nikolić (1803-1882), a professor of mathematics who preceded Josimović at Liceum wrote *Geometry* (published in 1841). A part of this book is devoted to trigonometry. However, Josimović *Trigonometry* is much more advanced and complete work on trigonometry. In fact, Josimović was very proud about his book. He wrote there (in old – Serbian) in somewhat challenging way:

U ostalom eda li i u koliko ovo moe delce odgovara izjavljenoj nameris njim i potrebi naši biši škola, za koje je napisano, - kao i je li raspoređenje i izlaganje njegovi predmeta pedagogično i praktično shodno: neka presude oni, koi sve to, pa dakle i istu nauku poznaju bolje nego ja. Kritika u tom obziru i od takovi lica bit'će mi tim milija, što bi se njom osim mana, koje na svaki način ispraviti valja, otkrilo ujedno i sve ono, što je originalno, i koje mi se dakle u pravu auktorsku zaslugu brojati ima. (Let's other, who know better this science than me, decide if this work is suitable, pedagogically written and practical for use in our high schools. Any appropriate critiques which find not only shortcomings, but also my original contributions will be very valuable for me.)

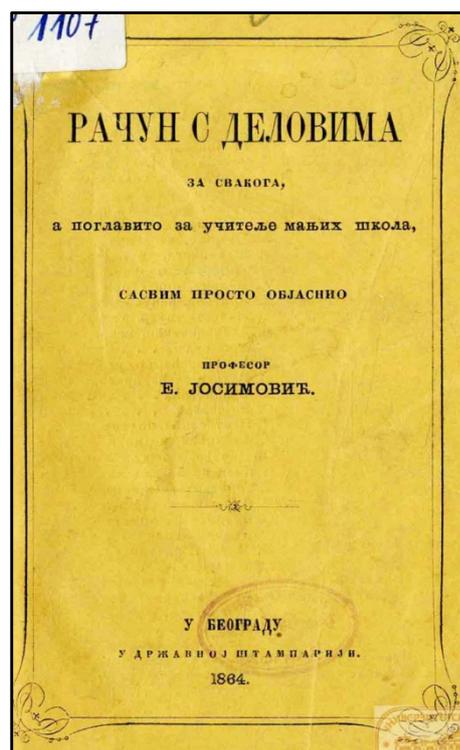
He also had to solve a lot of terminological problems. He studied mathematics in German, so he had to introduce many new words for mathematical notions not appearing until then in Serbian, e.g.: triugao (triangle - ms²): trougao), pruga (segment -

² in modern Serbian

ms: duž), osnovak (element - ms: element), dirka (tangent - ms: tangenta), prečnica (hypotenuses - ms: hipotenuza), upravnica (chatetus - ms: kateta).

Praktična geometrija (1862) (Practical Geometry)

Josimović wrote this book for the students of Liceum, also in old Serbian. As we can anticipate from the title and his occupation in this time, the content of the book is mainly on solving some practical problems in geodesy. The book itself consists of two chapters. The first part is devoted to the „elementary geodesy“, while the second refers to measuring and use of various instruments (barometers, etc) in geodesy and leveling.



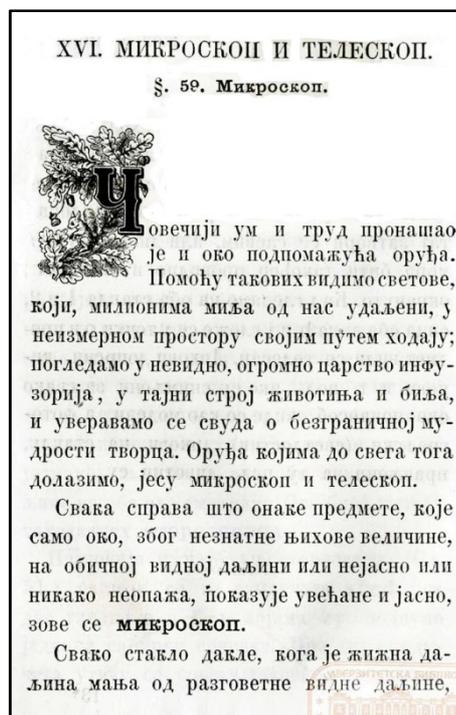
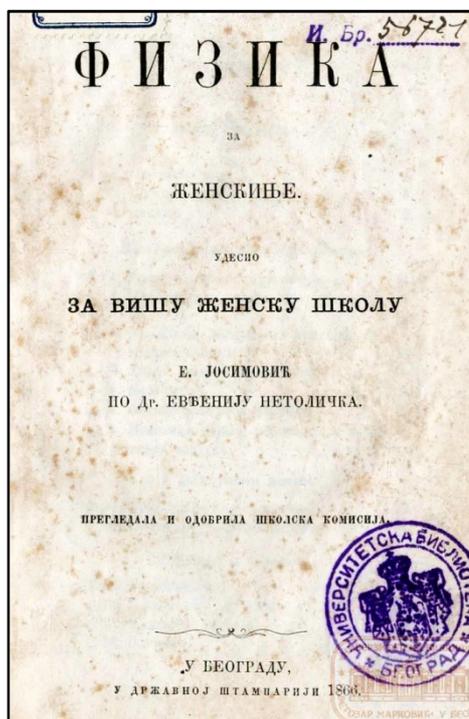
Račun s delovima (1864) (Fractional calculus)

This small booklet (it has about 100 small format pages) is probably his the least interesting book on mathematics but give us an insight in the content of mathematics that was taught in elementary schools in Serbia in the middle of 19. century. It is devoted to the fractional calculus (rational numbers and basic arithmetical operation with these numbers) and it is written mainly for the elementary school teachers. In a sense this book belongs to the series of the books written in the past: first Serbian mathematical book *Aritmetika* (printed in 1767) by Vasilije Damjanović (1734 – 1792) and *Čislenica* (printed in 1809) by Jovan Došenović (1781- 1813).

Fizika (1866) (Physics)

The proper name of this book is *Fizika za ženskinje* (Physics for ladies). As the title suggests this book is written for students of high lady school. The book is very

elementary but relatively large, it has 270 pages. There is no mathematical formula or expression which would represent any physical law. It could be said that he explained natural phenomena following the ancient Greek idea of four classical elements: air, water, earth and fire. Of course, he explained these entities from the modern point of view. The book also clarifies some other physical phenomena such as sound, light, magnetism and electricity. The construction and uses of some instruments (barometer, microscope and telescope) is explained. Finally, some applications of introduced notions are given such as steam machine, telegraphy and galvanization for gilding and silver-plating - "galvansko zlatenje i srebrenje". The book is written in modern Serbian in accordance to Vuk Karadžić linguistic reform which was officially adopted in 1868, even if its fundamentals were laid down two decades before that. The book contains a lot of nice illustrations and vignettes. It is worth reading this book because of nice writing style and use of old Serbian words, now completely forgotten.



Objasnenje predloga za regulisanje onog dela varoši Beograda što leži u Šancu (1867)

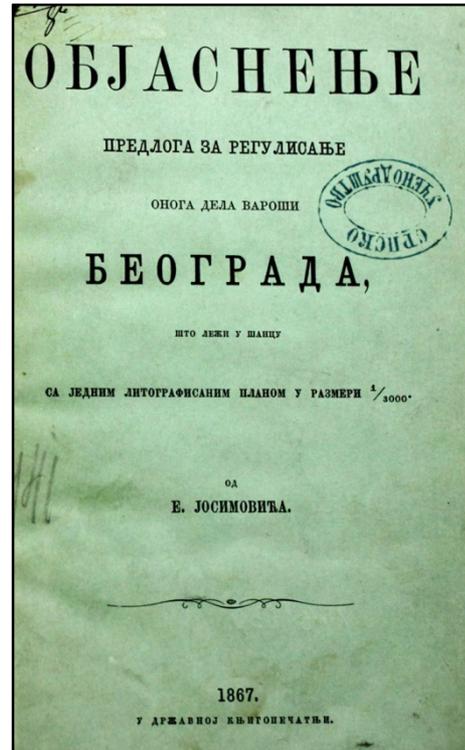
(Explanation of the proposal for a regulation that part of the City of Belgrade which lies in Trench)

This book is certainly Emilijan's the most important and best known work. There he proposed the first architectural and urban plan of the city of Belgrade. Plan referred to the area of today the city center, then bounded by the so called trench. This trench were the remains of the fortification which was built by Austrian Empire in the beginning of the XVIII century. This fortification and the origin of the trench has the interesting history. Namely, in 1717 the Austrians, led by Prince Eugene of Savoy, after big battle for Belgrade against Ottomans took over Belgrade and held it until 1739. In that period the medieval fortified town definitely disappeared and a modern Baroque artillery fortress was constructed on the same site. The reconstruction project (authored by Austrian Colonel of Swiss origin Nicolaus Doxat de Demoret) was carried out during the next 15 years. For its time that was a robust and pretty extensive fortification of Vauban's type (according to Marquis de Vauban, French engineer of the 17. century). It

was built in the hope that it will help the defense of Europe against the Otoman Empire. However, after the Austrian army had suffered several defeats, Austrian Belgrade surrendered to the Ottomans without fighting. According to a clause of the armistice contract signed on that occasion, Austrians had the right to hand Belgrade over to Turkey under the condition that all new fortifications (and some other buildings in the town) built after 1717, be destroyed. The demolition of the newly built Austrian fortifications lasted for almost six months and so the trench arose.



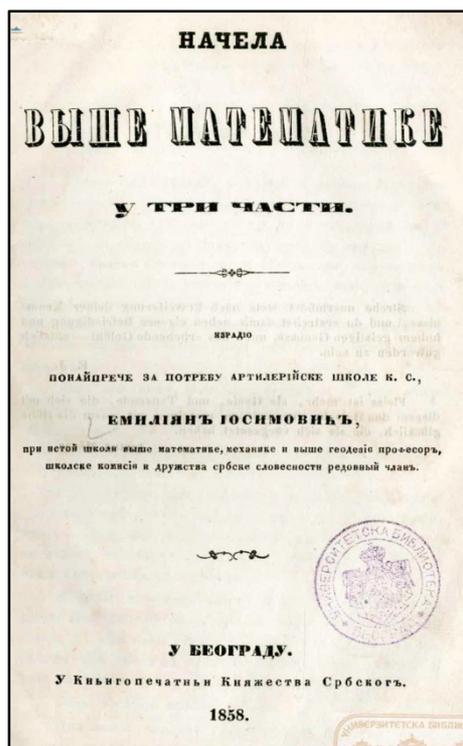
Part of the city of Belgrade bounded by the trench: it lies between the rivers Sava and Danube and the trench depicted by the yellow line.



This short book, it has only 47 pages and the supplement consisting of several drawings and maps, is considered as the first urban plan of the city of Belgrade. This urban plan had the great influence on the reconstruction and further urban planning of Belgrade in the 19. century but later as well. Due to this plan the most important streets in the center of Belgrade obtained their today's look. It is considered that this book not only represented in the modern sense of the word urban-engineering study, but its domain encompassed virtually all aspects of life in the city, ranging from social and cultural to anthropogeographic. Here is an interesting detail concerning the publication of the book. Even if the urban plan was made by order of Prince Mihailo Obrenović, then the ruler of Serbia, we read in the Introduction that the author completely financed the printing of the book.

Načela više matematike (Fundament of higher mathematics)

The book is composed of three volumes that were printed respectively in 1858, 1860 and 1872. The first two volumes were printed in old Serbian, while the last one in modern Serbian. The big delay between the second and the third volume can be explained that Josimović wrote the third volume first in old Serbian and then he had to "translate" it in modern Serbian according to the adopted Vuk Karadžić language reform. Even the short look in these books tell us that they are for this time the most advanced mathematical textbooks that far exceeded all previously published similar



books. For a modern Serbian reader it is very interesting to read in old Serbian such advanced topics as the convergence and summability of infinite series, or the properties of Bernoulli numbers. The first volume covers some algebraic concepts such as polynomials and rational expression, solving algebraic equations of the third and fourth degree and some general properties of functions. The second volume is mainly concerned with the differential calculus, while the third is on the integral calculus and the rather advanced topic, variational calculus. We will not enter here into the detailed analysis of these books, they deserve an article completely devoted to them. Here we mention that there is a rather fine analysis of this books written in Serbian by Đura Paunić [8].

Conclusion

Emilijan Josimović had great achievements and gave important contributions to the urban planning of the city of Belgrade, but also to the development of the teaching of mathematics and related sciences at the highest educational institutions in Belgrade in the middle of the 19. century. He published the first urban plan of Belgrade and several textbooks in mathematics, physics and geodesy. All his published works are digitized and they are now a part of his digital legacy in the Virtual library of the Mathematical Faculty in Belgrade. We believe that this material in the Library will serve to better understand Josimović's life and work.

Acknowledgment

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A monument devoted to Emilijan Josimović. It is located at the beginning of the *Knez Mihailova*, the central Belgrade street.