Viktor Radović, Nadežda Pejović
Faculty of Mathematics, University of Belgrade, Serbia

DIGITIZED SCIENTIFIC WORKS
OF PROFESSOR JOVAN LAZOVIĆ

Abstract. In this paper, we will present the digitized scientific works of Jovan Lazović, a respectable professor of the University of Belgrade. Professor Jovan Lazović and Jovan Simovljević continued the work of the Belgrade school for celestial mechanics who was started by our outstanding scientist Milutin Milanković. With his research papers, Lazović yielded significant contribution to celestial mechanics, especially in calculating their mutual proximities.

1. Introduction

Information technologies can be successfully applied to preserve our cultural, written and scientific accomplishments. The main aim of the Digitization project of the Faculty of Mathematics in Belgrade and the Mathematical Institute of the Serbian Academy of Sciences and Arts [1, 2] was to accomplish this goal of the preservation of our heritage. In order to achieve this goal, Virtual Library and Digital Legacies were developed.

Up until now, two digital legacies have been completed for two astronomers: esteemed academician Milutin Milanković [3] and professor Zaharije Brkić. These legacies are publicly available on the Digital Legacy web page of the Faculty of Mathematics: http://legati.matf.bg.ac.rs. Currently, we are developing two more digital legacies for two eminent astronomy professors Jovan Simovljević and Jovan Lazović. It is well known that Milutin Milanković was the first one in our region who included vectorial analysis and the vector-scalar system of elements of planetary orbits in the field of celestial mechanics. This system of planetary elements is usually called Milanković's system in his honour. Following Milanković's theory, Anton Bilimović introduced partial gradients of the perturbation force function. Their works and solving classical celestial mechanic's problems established a recognizable school of celestial mechanics at the University of Belgrade in both scientific and educational areas. Successors of this school built by eminent Milutin Milanković were Jovan Simovljević and Jovan Lazović.

In this paper, we will focus on the scientific results of professor Jovan Lazović and his short biography. In our other paper, "Professor Jovan Lazović and his digitized University Textbook" [4], we have already presented his detailed biography as well as his textbook "Fundamentals of motion theory of artificial Earth satellites", published by "Naučna knjiga" in 1976, which can be freely downloaded from Virtual Library of the Faculty of Mathematics (http://elibrary.matf.bg.ac.rs/handle/123456789/5200). Those works are part of the digital legacy dedicated to professor Jovan Lazović which is currently in its final stage of development.

2. Short biography of professor Jovan Lazović (1931-2019)

Professor Jovan Lazović (Figure 1) was born in May 22nd 1931 in Belgrade, Serbia. His parents, mother Leposava and father Petar, motivated him to get a solid education. He graduated in 1954 from the Faculty of Natural Sciences in Belgrade as part of the astronomy group. He defended his doctorate in 1963, ten years after he obtained his bachelor degree. He worked as a professor at the Faculty of Mathematics for the subject of a celestial mechanic.

Later in his career, Jovan Lazović introduced a new subject – The motion theory of artificial Earth satellites. For his lectures, he wrote the university textbook "Fundamentals of motion theory of artificial Earth satellites" (Figure 2) that was the first one concerning this area of science. This textbook was primarily intended for astronomy students on the last, fourth year of their studies at Department of Astronomy. This book started the development of this topic in Serbia. For instance, Stevo Šegan, lately professor at the Department, got his PhD in this area. Professor Lazović was retired on January 1st, 1997.

Professor Lazović spent his whole life working at the Faculty of Mathematics, where he dedicated his life to the science and education of future astronomers and mathematicians. He was also a member of the editorial office of the scientific journal "Publications of the Department of Astronomy". He led all work regarding publishing and printing this journal for 12 years (1970-1981).

On Saturday, August 3rd 2019, our professor passed away. He left permanent trace on the Serbian astronomy and on his colleagues and students at Faculty of Mathematics, University of Belgrade.

Figure 1. Professor Jovan Lazović

Figure 2. "Fundamentals of motion theory of artificial Earth satellites" by Jovan Lazović

3. Scientific work of Professor Jovan Lazović

Here we will first introduce Jovan Lazovic's doctoral dissertation, after which we will focus on his scientific contribution with some special attention on papers published in the peer reviews journals.

3.1. Doctoral dissertation. He defended his doctorate in astronomical sciences in 1964 at the Faculty of Mathematics, University of Belgrade (Figure 3). The title of his doctoral dissertation is "Some essential characteristics in the motion of the quasicomplanar planetoids". On the board for his defense were academicians Radivoje Kašanin, Tatomir Anđelić and Vojislav Mišković, who was his mentor during the writing process (Figure 4) His dissertation is digitized and available at the Virtual Library –

http://elibrary.matf.bg.ac.rs/handle/123456789/223.

Figure 3. Professor Lazović during defense of his doctoral dissertation in 1964.

The main subject of his doctoral dissertation is comprehensive analysis and examination of the motion of two small objects (planetoids) with a similar angle of inclinations of their orbital planes. He took special consideration for the problem of their proximities which is a problem of determination of their position when the mutual distance between two planetoids is minimal. For this problem, he derived the original method to determine its orbital positions during their proximities. Further, he discussed the preconditions for the occurrence of the proximities and changes of their osculatory elements during this event. These theoretical researches were confirmed and illustrated on the movements of two asteroids (589) Croatia and (1564) Serbia which can approach each other very closely.

Another part of his research presented in the doctoral dissertation was the calculation of perturbation of the orbit of one body, which happens during the proximities under the strong mutual gravitational attraction. The results were used in order to determine precisely the whole mass of the perturbed body.

3.2. Scientific works. Professor Lazović was actively and with noticeably accomplishments doing his research in the celestial mechanics and theory of the motion of planetoids. His particular focus was the proximities of those bodies. His scientific research results were published in more than thirty papers in respected scientific journals. Besides, he published six professional papers in various publications.

The majority of Lazovic's scientific works belong to the proximities of planetoids that were sporadically addressed by some famous astronomers but without any significant results. Shortage of the concrete results led to the silent belief that these events were infrequent and rare and had significant effects. Additionally, before the pioneering works of professor Jovan Lazovic, a small number of planetoids, which had a possibility of the proximities, had been investigated. The main reason for this was the
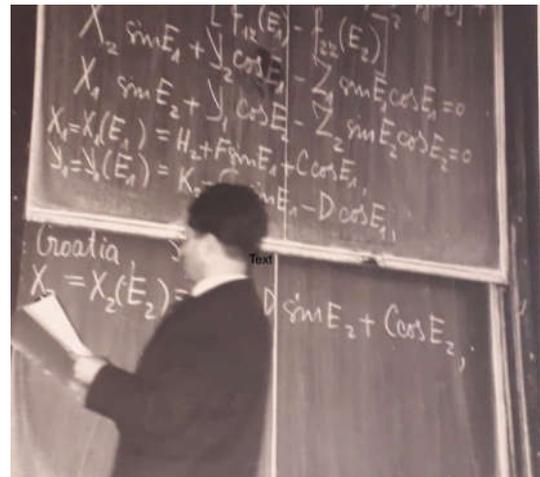
lack of an efficient algorithm for the calculation of their proximities. Lazovic's works significantly changed this situation, which is why his works were published in famous peer-reviewed journals – "Transaction" of International Astronomical Union (IAU), bulletin of annual works in the fields of planetoids of Russian academy of science and many more. As a result of his various contributions, he was elected as a member of IAU and a member of IAU's division for celestial mechanics. Also, it is important to note that his works were extensively cited.
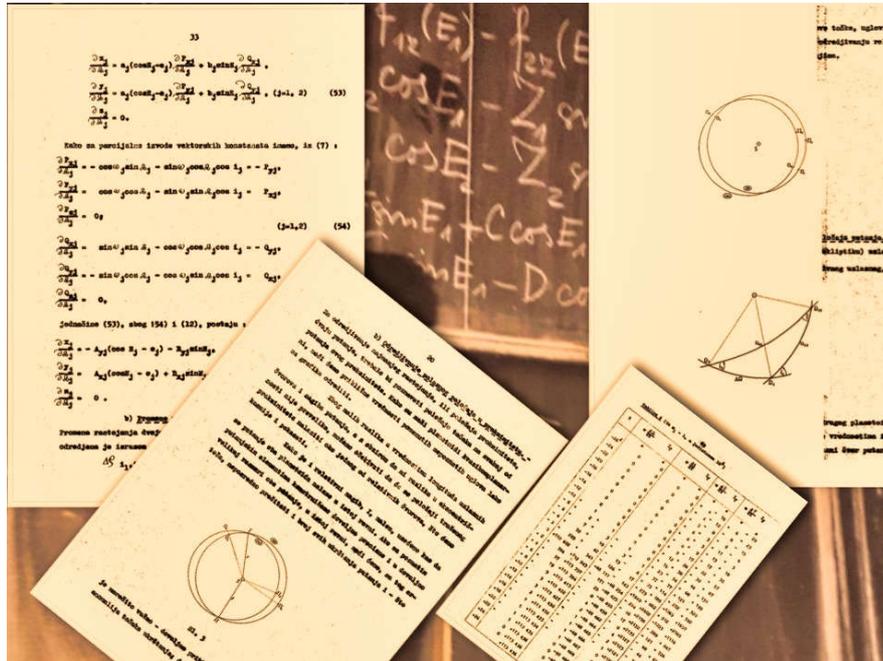
Figure 4. Selected pages from doctoral dissertation of professor J. Lazović.

His professional papers cover a wider field of different astronomy problems: physical characteristics of planet Mars especially his atmosphere, the current situation regarding terrestrial planets, white dwarfs etc. These works were intended for a broader audience.

Specifically, we want to highlight his collaboration with his assistant and professor, Mike Kuzmanoski, whom he introduced to celestial mechanics and the theory of proximities. Together, they gave significant contributions and noticeable results [6, 7].

3.3. Bibliography

3.3.1. Scientific papers

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4. Conclusion

Jovan Lazović made a meaningful contribution to the calculation of the proximities of celestial bodies. His results were broadly recognized. During 2020 and 2021, we have collected the material to create the digital legacy of our professor Jovan Lazović. The first part of the gathered material was presented in paper [4], while the second one has been presented in this paper. Digital legacy dedicated to Jovan Lazović will be soon finished and publicly available on http://legati.matf.bg.ac.rs/. We believe that this digital legacy will help better understand his life and legacy and the development of Serbian astronomy in the second half of the XX century.

Acknowledgment

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rviktor@matf.bg.ac.rs
nada@matf.bg.ac.rs