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DIGITAL LEGACY OF MIHAILO PETROVIĆ ALAS

Abstract. In this paper we present the website Digital legacy of Mihailo Petrović Alas (1868-1943), the most distinguished Serbian mathematician, the founder of the so called Serbian mathematical school and the former professor at the University of Belgrade. This site is an extension of the project Digital legacies of the Faculty of Mathematics in Belgrade, <http://legati.matf.bg.ac.rs>. The aim of this project is to collect, digitize and present to the general audience the life and work of the prominent Serbian mathematicians.

Introduction

Digital legacy of Mihailo Petrović is the fifth archive and Internet presentation in the framework of the project Digital legacies. So far digitized inheritance of the following scientists have been made: Milutin Milanković (1879-1958), geophysicist, theoretical mechanist and civil engineer, best known for his theory of ice ages, Bogdan Gavrilović (1864-1948), mathematician, one of the founders and rectors of the University of Belgrade, Anton Bilimović (1879-1979), the leading Russian-Serbian mechanic in the first part of the XX century and Slaviša Prešić (1933-2008), a mathematician who introduced in Serbian schools modern algebra and mathematical logic. These choices illustrate the primary aim of our project, to allow the general public easy access to the heritage of the most important Serbian mathematicians from the past. Technically, Digital legacies, see [6], [7], are conceived as a set of several websites dedicated to individual scientists, so that the collected material comprise a single digital archive. This enables one unified search of the site and use of its content.

Academician Mihailo Petrović was a distinguished professor of mathematics at Belgrade University, fisherman, writer, philosopher, musician, and World traveler. He got the nickname *Alas* as he was a dedicated and widely known river fisherman. He was a student of famous French mathematicians Henri Poincaré, Charles Hermite and Charles Émile Picard. Petrović had significant contributions in geometry of polynomials (see [4]), differential equations and phenomenology. Professor Petrović founded the Belgrade School of Mathematics. As the years passed, this very school was responsible for producing a number of good mathematicians who continued his works where he left them. Until the Second World War, all of the doctoral dissertations in mathematics obtained in the University of Belgrade were held under his supervision. He also was a cryptographer and invented some analog computing machines.

The site is not completely finished, but at the moment of the writing this paper, the collected material from the enormously rich legacy of Mihailo Petrović includes all his books, university lectures and some scientific papers. It also contains some photos, biographical papers, articles and notes on him written by other people. Mihailo Petrović had unusually rich and interesting life and so several films and TV series which presented some episodes from his life were produced in meantime. It is planned to deposit in the Digital legacy all available audio and video material of this kind. The

Serbian Academy of Sciences and Arts will dedicate the year 2018 to Mihailo Petrović, to mark the anniversary, his 150 birthday. Our project *Digital legacy of Mihailo Petrović Alas* is considered as a part of this jubilee.

The website of the Digital legacy was created using the WordPress software tool, a free and open-source content management system.

Short Biography of Mihailo Petrović



Figure 1 Mihailo Petrović Alas (1868-1943)

Many authors, Serbian and foreign, wrote short or lengthy articles on Mihailo Petrović. Milutin Milanković wrote a book *Mihailo Petrović Alas* [5], while Miodrag (Dragan) Trifunović wrote doctoral dissertation about his life and work. There are many Internet sites such as *Famous Scientists* (<https://www.famousscientists.org>) or *Wikipedia* where the interested reader can find many exciting facts on Mihailo Petrović, typically concerning fishing, his expeditions on World seas and his somewhat unorthodox life.

Therefore we have a rather difficult task to add besides this plenty anything new or even interesting on his biography in a short space. So instead of biography we shall present a chronology of Mihailo Petrović's life which will include some of the main references of other authors. Moreover, we believe that this chronology reflects properly the content

and the architecture of the Internet site *Digital legacy of Mihailo Petrović*.

Birth and education

- 1868** Born on May 6 (April 24th in the Julian calendar) in Belgrade by mother Milica and father Nikodim who was a theology professor.
- 1878-85** Enrolls and finishes the First Belgrade Gymnasium in generation with Milorad Mitrović, Jovan Cvijić, Pavle Popović and other eminences of Serbian science and culture. About this was recorded a TV film *Hatchet of Professor Vujić*.
- 1885** Started studies of mathematics at the Faculty of Philosophy in Belgrade.
- 1889** Completed studies in Belgrade and went to Paris for further education and preparation of the entrance examination for enrollment at the famous *École Normale Supérieure*.
- 1890** Passed the entrance exam for enrollment at *École Normale Supérieure*
- 1891** This year he received a state scholarship of Serbia.
- 1891** Graduated from the Sorbonne in mathematical science.
- 1893** Graduated from physical science at the same university. As the best student of his generation, attended this year reception with the president of the French

Republic, as well the next year.

- 1894** Defends the Doctoral Dissertation *Sur l'zeros and les infinus des intégrales des équations différentielles algébriques* (On zeros and infinities of the integral of algebraic differential equations) in front of a commission made by the most distinguished French mathematicians: Charles Hermite, Émile Picard and Pol Painlevé.

Academic career

- 1894** Elected as a full-time professor of mathematics at the Grand School in Belgrade.
1896 Became member of the Society of Italian Mathematicians in Palermo.
1897 Elected as a correspondent member of the Serbian Royal Academy and a correspondent member of Yugoslav Academy of Sciences and Arts in Zagreb.
1899 Elected as a regular member of the Serbian Royal Academy. He was old only 31 years.
1905 He belonged to the group of the first eight professors of the Belgrade University which was founded this year. One of their tasks was to choose the other teachers of the University.
1908-09 Dean of the Faculty of Philosophy in Belgrade.
1927 This year died Jovan Cvijić, the president of the Serbian Royal Academy. Petrović was nominated for the next president. This proposal was rejected by the higher authorities because of his friendship with Prince George, who was in the displeasure of the King Alexander I.
1931 The nomination for the presidency of the Serbian Royal Academy was repeated, but the proposal is again rejected.
1939 He received the honorary doctorate from the Belgrade University and Decoration St. Sava of the first degree.

Scientific work

- 1884** Wrote his first scientific paper. At this time he had only 16 years.
1900 Designed a hydro-integrator and won for this a golden Medal at World exhibition in Paris.
1909 On the proposal of Mihailo Petrović, Jovan Cvijić and Bogdan Gavrilović, Belgrade University invited Milutin Milanković for a professor of applied mathematics. Milanković accepted the invitation and came to Belgrade in the same year.
1912 At the University of Belgrade, the first doctoral dissertation from mathematics was defended. Thesis is written by Mladen Berić under the mentorship of Mihailo Petrović.

Scientific work and other activities by fields

The following authors wrote:

- A. General texts on Mihailo Petrović: J. Kečkić [1], [2], D. Trifunović [15], A. Nikolić [9] and Lj. Protić [12].
 B. Differential Equations **SD** books 1, 2, B. Stanković; Lj. Protić.
 C. Mathematical analysis of **SD** books 3, D. Arandelović.
 D. Algebra, geometry of polynomials, M. Marden [3], **SD** book 4, Ž. Mijajlović.
 E. Mathematical specters and interval mathematics, **SD** books 5, 8, D. Adamović.
 F. Mathematical phenomenology, **SD** book 6, M. d' Ocagne, R. Marchal, M. Stojaković, A. Buhl, etc.

- G. Numerical mathematics and algorithms, **SD** books 8 and 9, D. Trifunović.
- H. Articles on mechanics, astronomy, relativity theory, numerical machines, etc, **SD** book 9, M. Marjanović, D. Trifunović.
- I. Travelogues, **SD** books 11, 12, S. Peković.
- J. Metaphors and alegories, **SD** book 13, S. Peković.
- K. Fisheries, **SD** book 14, D. Trifunović.
- L. Correspondence, **SD** book 14, D. Trifunović.

Great ocean trips

- 1931** Member of French expedition to the North Sea, from France to Hammerfest, Greenland and Iceland. Note that he had then 63 years.
- 1932** Next expedition was to the Caribbean, tour around the Bermuda Triangle and the Sargasso Sea.
- 1933** The third big trip, now to Labrador and Newfoundland.
- 1934** Member of expedition to Canary and Cape Verde Islands, St. Helena and the south the Atlantic Ocean and the tour to Antarctica.
- 1935** The last expedition was to the Indian Ocean, the route through the Suez Canal, the Red Sea and the visit to Madagascar. During this trip he got malaria.

Fishing

- 1882** Became a fisherman apprentice.
- 1888** Obtained his first diploma for fishing art and became a fishing calf.
- 1895** Passed an exam for a fishing master.
- 1898** Participated in the preparation of the first law for fishing on lakes and the rivers of Serbia.
- 1900** A member of the delegation for the agreement of the fishing convention with the Austro-Hungarian Empire.
- 1902** A member of a similar delegation to reach an agreement with Romania.
- 1907** In London, as part of the Balkan exhibition, he organized an exhibition of Serbian fisheries.
- 1911** At the international exhibition in Turin, he received a gold medal for the exhibited showpieces from fishing.
- 1912** Captured the trophy, a catfish having 120 kilos.
- 1919** One of the founders of the Institute of Oceanography in Split.
- 1920** Bought a 13-meter steamer to which he named "Carash".

Other activities

- 1896** Founded the famous tavern music company "Suz".
- 1912** He was one of the participants in the Balkan Wars.
- 1914** During the First World War, he was one of the officers.
- 1918** After that time, he was serving as a reserve officer despite having another profession. Being a brilliant mathematician, he practiced cryptography as well and the cipher systems he developed where those used by the Yugoslav army up until the Second World War.

Last years

1938 Retired.

1939 Received the honorary doctorate from the Belgrade University and Decoration St. Sava of the first degree.

1941 At the age of 74, as a reserve officer, he called again to war. Germans captured him but due to the sickness and old age, he is released from slavery after a year.

1943 Passed away on June 8 in his home on "Kosančićev venac" street in Belgrade.

Implementation of the Digital Legacy of Mihailo Petrović Alas

Digital Legacy of Mihailo Petrović Alas is a website at the temporary address <http://alas.matf.bg.ac.rs/~websites/digitalnilegatmpalas>. Even if the most of the material planned to be included in the site is collected, it is not yet finished. When completed, it will be moved on the main page of Digital Legacies, <http://legati.matf.bg.ac.rs>. At the moment of writing this paper, the site contains only particular writings of Mihailo Petrović and some of his books, but very soon photos and other digitized items will be posted there.

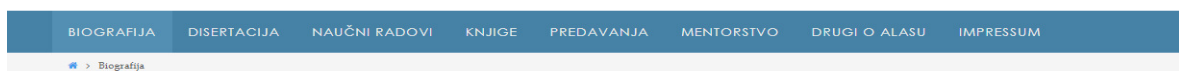
The site is built using an open-source content management system WordPress [IR3]. WordPress is developed on PHP programming language and MySQL database and it is very popular and the fastest growing content management systems [IR4]. Thousands of available plugins, widgets and themes for WordPress allow the simple and fast definition of the look and functionality of websites. The look of the Legacy is defined using the theme Nirvana.

Content of the Digital Legacy of Mihailo Petrović

Digital Legacy of Mihailo Petrović Alas, beside the biography (Figure 2) contains material in various digital formats about his life and scientific work. Materials from Petrović's scientific work include professional and scientific papers, books and some photos. Many presented items are commented. There is also a part containing the writings of other authors on Mihailo Petrović.

Digitalni legat Mihaila Petrovića Alasa

Matematički fakultet Univerziteta u Beogradu



Biografija

Tekst je preuzet iz knjige *Život i delo srpskih naučnika, knjiga 2*, SANU, Beograd, 1997.

Autor biografije je Jovan D. Kečkić.

Za Mihaila Petrovića često se kaže da je bio osnivač tzv. beogradske matematičke škole. Rođen je 1868. godine u Beogradu, gde je završio osnovnu školu (1878), srednju školu (1885) i prirodno-matematički odsjek Velike škole (1889).



Od 1889. do 1894. studirao je na *École Normale Supérieure u Parizu*, gde je na *Faculté des sciences* stekao diplomu matematičkih nauka (*licence és sciences mathématiques*, 1892), diplomu fizičkih nauka (*licence és sciences physiques*, 1893) i doktorat matematičkih nauka (*docteur és sciences mathématiques*, 1894). Doktorsku disertaciju *Sur les zéros et les infinis des intégrales des équations différentielles algébriques* Petrović je odbranio pred komisijom: *Ch. Hermite* (predsednik) i *É. Picard*, *P. Painlevé* (članovi ispitivači). Ni pre ni posle njega nijedan srpski matematičar nije odbranio doktorat pred komisijom takvog ranga.

Odmah po povratku u Srbiju, 1894. godine izabran je za redovnog profesora Velike škole. Bio je jedan od prvih osam redovnih profesora Univerziteta u Beogradu, osnovanog 1905. godine, i sve do penzionisanja 1938. predavao je teorijsku matematiku na Filozofskom fakultetu. Bio je prodekan i dekan tog fakulteta. Takođe je imao zvanje *professeur agrégé* na univerzitetima u Parizu i Brisku.

Redovni član Srpske kraljevske akademije postao je 1900. godine i veoma je aktivno učestvovao u njenom radu. Bio je član i više inostranih akademija nauka i velikog broja naučnih društava.



Figure 2. Page of Digital legacy of Mihailo Petrović Alas with his biography

Available materials are divided into the following groups: doctoral dissertation (Figure 3), scientific papers, books, notes of university lectures, doctoral dissertations of students to whom Mihailo Petrović was supervisor and documents written by other people on Mihailo Petrović. There are many rather interesting photos that illustrate various episodes from his life, such as fishing and expeditions. Most of them are already digitized and it is planned to include them in the Legacy very soon.

The oldest presented Petrović's document is a copy of the manuscript from 1886. Particularly interesting documents are handwritten notes of lectures which were delivered at the Belgrade University by Mihailo Petrović (Figure 4). Notes of later lectures were almost certainly taken by Petrović's student Borivoj J. Pujić around 1910 [8] and are written in the same beautiful handwriting. The reader will find that some of the lectures were rather advanced, for example Petrović' lectures on differential equations. There are altogether 14 of these manuscripts.

Disertacija



Sur les zéros et les infinis des intégrales des équations différentielles algébriques

Mihailo Petrović

Paris

[Podaci u eBiblioteka](#)



LES ZEROS ET LES INFINIS DES INTEGRALES

Mihailo Petrović

Mentor: Hermite MM.

Paris

21.05.1894.

[Podaci u eBiblioteka](#)

Figure 3 Doctoral Dissertation of Mihailo Petrović Alas which is presented at the website Digital Legacy of Mihailo Petrović Alas

Documents were written in Serbian or French. Digital copies of presented documents are deposited in the Virtual Library of the Faculty of Mathematics of the University of Belgrade. Along with each document presented in Digital Legacy of Mihailo Petrović Alas, there is a link to its copy in the Virtual Library.

Most of the presented material has been collected by professor Mijajlović and large part of it belongs to the Library and Archive of the Serbian Academy of Science and Arts.

Predavanja



Teorija algebarskih jednačina

Mihailo Petrović
 Urednik: Borivoj J. Pujić
 Beograd
 1956
[Podaci u eBiblioteka](#)



Teorija izvoda sa primenama

Mihailo Petrović
 Urednik: Borivoj J. Pujić
 Beograd
 1957
[Podaci u eBiblioteka](#)



Diferencijalni račun

Mihailo Petrović
 Beograd
 1958

Figure 4 Notes of university lectures of Mihailo Petrović Alas presented in the Legacy

Conclusion

Mihailo Petrović Alas was a distinguished and influential scientist and professor of mathematics of the University of Belgrade in the first half of the XX century. He was also an artful fisherman, World traveler, travelogue writer, musician and philosopher. So he left behind a rich legacy not only in mathematics, but also in other fields. He is also considered as a founder of modern Serbian mathematical school. Most of today's Serbian mathematicians are his descendants, as can be seen at the address www.genealogy.math.ndsu.nodak.edu, the Mathematics Genealogy Project. The aim of the Digital Legacy of Mihailo Petrović Alas is to present in one place his work and life and to make it available to a wider auditorium.

Acknowledgment

This work was supported by the Serbian Ministry of education, science and technology (project III44006). The authors are also grateful to the anonymous referee who gave many valuable suggestions related to the paper.

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Internet resources

IR1. Digitalni legati, <http://legati.matf.bg.ac.rs>

IR2. Virtual library (abbr. VB), <http://elibrary.matf.bg.ac.rs>

IR3. WordPress, <https://wordpress.org>

IR4. W3Techs, <https://w3techs.com>

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