Bulgarian Physical and Mathematical Culture in 19 Century

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Abstract. Nevertheless major quantitative differences between Bulgarian physical and mathematical culture in 19 century, the mathematical methods in physics are used to indicate the level of the advanced schools in Svishtov and Plovdiv before our Liberation and the first University in Sofia after that.

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INTRODUCTION

Bulgarian Physical and Mathematical culture had old traditions in practice and Christian literature. When we became part of the Ottoman Empery in 1396, Bulgarian Christian culture was preserved and isolated for a long time. Only an individual well to do merchants had access to European modern physics and mathematics. After establishment more intensive economical and educational contacts with Greece, Serbia and Russia, secular physical and mathematical culture grew up in Bulgaria from the end of 18 and the beginning of 19 centuries. The aim of this work is to indicate dependence between specific characters of physical and mathematical culture in 19 century and ways they come in Bulgaria.

EDUCATION IN PHYSICS AND MATHEMATICS

Western education in physics and mathematics entered in Bulgarian schools indirectly by Greece and Russian influence [1]. In that reason, we had two types of schools: school with two degrees from the end of 18 century, and school with classes since 1835 [2]. In the beginning, there were hand-written textbooks of physics and mathematics only [3]. Educational levels were illegible before our Liberation in 1878. We collated textbooks in mathematics, written up to 1878, with syllabus, approved by Ministry of education in 1890. Four levels were detached: elementary (1792-1824), primary (1824-1846), secondary (1846-1889), and University after that [4].

Elementary Mathematical Culture

Subjects, arithmetic, reading and writing, had in our elementary school. Marko Teodorovich (1792) and Pierre Beron (1824) wrote their "*ABC books*". Section "*Arithmetic*" with Arabic quantities and operations addition, subtraction, multiplication and division took in all of them [5]. Chapter "*Physical Stories*" told about meteorological phenomenon: steam, cloud, fog, rain, hailstorm, snow, dew, and frost.

Primary Education

Primary education started in Bulgarian schools in 20th years of 19 century. Joined to Europe along the river Danube, Svishtov became center of physical and mathematical culture at first. Svishtov schoolmasters initiated physics as an independent subject and wrote first Bulgarian primary mathematical textbooks.

Primary Mathematical Culture

New subject geometry and new mathematical elements fraction, ratio, Pythagoras theorem and letter symbols characterized primary mathematical education in first and second classes, V-VI classes today (Hristaky Pavlovich, 1833 and Neofit Hilendarsky, 1835). Raise to second power, square and cubic roots marked mathematics in third class, seventh class today, (Hristodul Sichan Nikolov, 1845). Geometry contained line, angle, triangle, polygon, circle, surface and capacity in first, second and third classes, V-VII classes today (Veselin Gruev, 1867).

Primary Physical Culture

Emanuil Vaskidovich initiated physics in his school in Svishtov. He became teacher in 1815. The school had two stages (elementary and primary), and Chronicle, written in Bulgarian language in 1824. The program included physics, arithmetic, algebra, history, political economy, geography, anatomy and Greek language. Ivan Seliminsky opened second primary school in Sliven and taught physics (1828-1829). We know nothing about physics content up to half of 19 century. There were not formulas in primary textbook in "*Physics*", translated by Yoakim Gruev in 1872.

Secondary Education

First Bulgarian secondary school created Nayden Gerov, who was one of our reputable citizens. He opened independent normal school in his native town Koprivshtisa in 1846. Four years later, he placed it to Plovdiv as a Central eparchial school "*St. Kiril and Methody*". The school had only higher IV-VI classes (VIII-X classes today) in the beginning. It grew up to six class secondary school, educated teachers and priests in 1868.

Secondary Mathematical Culture

Bulgarian authors of secondary mathematical textbooks proved algebraic and geometric theorems. Sava Radulov introduced parametrical equation, quadratic and cubic equation, irrational number, arithmetical and geometrical proportions in 1843. Hristo Vaklidov described algebraic expression and inequality in 1859. Nestor Markov wrote trigonometry, plane and space geometry in 1871. Plane geometry comprised geometrical figures, parallel lines, similar triangles and polygons. Space geometry, written by I. Gjuzelev, considered space lines, planes and angles, polyhedrons, cylinders, cones, and spheres (1873).

Secondary Physical Culture

N. Gerov initiated secondary education in physics in Bulgaria (1846). He taught three years course in physics and wrote textbook in physics. He published first part "*Mechanics and Acoustics*" in Beograd (1849). The second part "*Heat, Light, Magnetism, and Electricity*" was hand-written [6]. He used secondary mathematical culture to present physical laws with text and numerical examples mainly. We find figures and drawings at the end of textbook. Ivan Gjuzelev recorded physical laws more strictly in 1874. He solved physical problems for the first time.

University Physics and Mathematics

General specialty physics and mathematics existed in Sofia University (1889-1921). Mathematicians Emanuil Ivanov, Anton Shourek, Atanas Tinterov, and Spiridon Ganev lectured projective, descriptive, analytical, and high geometry, differential, and integral calculus, algebraic, and high analysis, basis of high mathematics, high algebra, calculus of probability and analytical mechanics. Physicists Porphiriy Bachmetjew and Marin Bachevarov lectured experimental physics, methods of measurement, and astronomy.

PHYSICAL AND MATHEMATICAL RESEARCH

European results came in Bulgaria directly with our scientists. Demetrius Mutieff defended PhD in physics (1842). Ivan Salabashev solved mathematical problem in 1875. PhD in mathematics defended S. Ganev (1893) and Ivan Dedov (1896). Members of Bulgarian Academy of Sciences became mathematicians I. Gjuzelev (1875), G. Kirkov (1881), V. Vasilev (1881), E. Ivanov (1898) and physicists Spass Vatsov (1881), and P. Bachmetjew (1898). Bulgarian physical and mathematical culture grew up together in 19 century. Mathematician Ivan Gjuzelev investigated physical problems, and physicist D. Mutieff used many experimental dates, measured from different humidity apparatus, to compose parametrical equations.

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