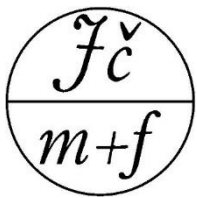


*Czech Society for History of Science and Technology (SDVT) and  
Czech Mathematical Union (JČMF)*



cordially invite you to an interdisciplinary workshop



## **Geometry in Society A Historical Perspective**

### **Programme**

#### **Thursday 13 June 2024**

- |             |  |
|-------------|--|
| 9:30–10:00  | Welcome and introduction to the theme  |
| 10:00–10:45 | <b>Martin Pavlíček</b> (UHK, Hradec Králové)<br>Rovnostranný trojúhelník (Equilateral triangle)  |
| 10:45–11:30 | <b>Adéla Svobodová</b> (MU Brno)<br>Geometrical imagery in the work of Martianus Capella   |
| 11:30       | coffee   |
| 12:00–12:45 | <b>Petra Antošová</b> (MU Brno)<br>Immortal geometric problems for Czechoslovak pupils   |
| 12:45–13:30 | <b>Jakub Novák</b> (MU Brno)<br>How can be sextant useful in the 21st century?   |
| 13:30       | lunch  |
| 15:30–16:30 | <b>Invited lecture: Eva Bendová</b> (TU Liberec) and <b>Michal Plavec</b> (NTM Prague)<br>Airport Layout. Geometry as a key Science in Airport Design during the first half of 20th Century                    |
| 16:30       | coffee   |
| 17:00–17:45 | <b>Václav Votoupal</b> (VSB–TU Ostrava)<br>Rudolf Skuherský (1828–1863): první profesor deskriptivní geometrie na pražské polytechnice (the first professor of Descriptive Geometry at the Prague Polytechnic) |
| 17:45–18:30 | <b>Jan Kotůlek</b> (VSB–TU Ostrava)<br>Cooperation of Czech geometers and engineers in mining and geology  |
| 19:30       | joint dinner   |

## Friday 14 June 2024

9:30	Coffee
10:00–11:00	<b>Invited lecture: Tilman Sauer</b> (JGU Mainz) The fourdimensional geometry of Hermann Minkowski
11:00	coffee
11:30–12:15	<b>Emil Simeonov</b> (FH Technikum Wien) Some issues in primary school mathematics
12:15–13:00	<b>Helena Durnová</b> (MU Brno) The Paths of Geometry into the Teaching of Mathematics
13:00	closing remarks and lunch

Talks of Martin Pavlíček and Václav Votoupal will be interpreted from Czech to English.

### Abstracts Invited papers

#### **Eva Bendová (TU Liberec) and Michal Plavec (NTM Prague)**

**Airport Layout. Geometry as a key Science in Airport Design during first half of 20th Century**

An Airport and/or an Airfield? The Airport means aerial harbor and the Airfield definitively grass field. The harbor served after WW1 for commercial airlines which connected cities and countries, shortened world. Architects had the goal to project the airports as an accumulated centre of taxi-ways and runways and administrative and maintenance buildings as hangars and workshops. A bold architectonic plan had for example Swiss architect Charles-Édouard Jeanneret (Le Corbusier) to construct airport inside of the City of Paris. And he wasn't alone. Antonio Sant'Elia had, for example, an idea to construct an airport on the roofs of houses and buildings in the city. Their airport layout was circle and/or rectangle from the point of view of geometry. Josef Gočár (Kbely Airport) and Adolf Benš (Ruzyně Airport) belonged to best known Czechoslovak airport architects. Maximum use of airport area was essential. The first runways were projected according to the letter T shape, but more efficient was use of circle, respectively equilateral triangle inside circle. It gives the Third Dimension in projecting of three runways in a very small place. This idea was improved at the end of 1930s and architects came back to T-shape in the circle with using of so-called Steiner Tricorn to be more effective.

## **Tilman Sauer (JGU Mainz)**

### The fourdimensional geometry of Hermann Minkowski

In today's theoretical physics, Hermann Minkowski's name is forever associated with the four-dimensional formulation of relativistic space-time, frequently referred to as Minkowski space-time. I will discuss the significance of Minkowski's mathematical reinterpretation of special relativity but also comment on some of his other work in mathematical physics like analytical mechanics and the theory of capillarity.

## **Contributed papers**

## **Petra Antořová (MU Brno)**

### Immortal geometric problems for Czechoslovak pupils

After the Second World War, great emphasis was placed in Czechoslovakia on raising the level of teaching mathematics and technical fields. A variety of ways were used to get pupils interested in mathematics, an example being the establishment of the Czechoslovak Mathematical Olympiad in 1951 and a number of other competitions in the following years. Periodicals intended directly for pupils were not left behind, the most widespread of which was the Young Pioneer Newspaper. They regularly published the column For Bright Heads, which was filled with all kinds of riddles, not only of a mathematical nature. It also often featured geometric problems of a recreational mathematical nature, while some of them remain in the role of popular recreational mathematical problems to this day. The article will describe the geometric problems published in the competition column For Bright Heads and will not forget some types of problems published in the early 1970s already in the form of a book by řtefan Novoveský, Karol Křiřalkovič and Imrich Leček as part of the Library of General Education edition.

## **Helena Durnová (MU Brno)**

### The Paths of Geometry into the Teaching of Mathematics

The differential geometer Eduard Čech (1893–1960) is considered the most influential Czechoslovak mathematician of the 20th century. Acquiring professorship in Brno at the age of 30, he was the first Czechoslovak mathematician to stay at the IAS in Princeton (1935/36) and also the first director of the Mathematical Institute of the Czechoslovak Academy of Sciences in 1952. He surprised his colleagues in the late 1930s by turning his attention to the issues connected with teaching mathematics at lower secondary schools. Albeit the first editions of his textbooks were considered “too scientific”, Čech's contribution to changing the way mathematics was taught is doubtless. In his efforts, he was joined also by the geometers František Vyčichlo (1905–1958), Jan Vyřin (1908–1983), Emil Kraemer (1910–2001) and Rudolf Zelinka (1907–1965). In my talk, I will show how geometry became a showcase of mathematics teaching in postwar Czechoslovakia.

## **Jan Kotůlek (VSB–TU Ostrava)**

### Cooperation of Czech geometers and engineers in mining and geology

Tradition of geometric application in mining and geology at the Mining University (then in Příbram) dates back to 19th century. It has grown with the reorganisation of the departments in 1919 and appointment of František Čuřík (1876–1944), to the Department of Mathematics and Descriptive Geometry and František Čechura (1887–1974) to the Department of Geodesy and Mine Surveying. After WW2, Mining University was relocated to Ostrava, where it should work in close connection with modern coal mines in the region. In the 1950s, the cooperation of the two branches was reestablished with Čechura's successor Karel Neset and mathematician Oldřich Hajkr. Hajkr's career took off with the works on geometric aspects in mine surveying and led him also to high positions in university administration and later also to political functions.

## **Jakub Novák (MU Brno)**

### How can be sextant useful in the 21st century?

A sextant, as a navigational tool from 18th century, can be today perceived as outdated and obsolete. As will be shown in this talk, such beliefs cannot be further from the truth. After a brief introduction to the history of marine navigation, elementary methods of using a sextant will be presented. Then, two dimensions of modern use will be studied: practical and educational.

## **Martin Pavlíček (UHK, Hradec Králové)**

### Rovnostranný trojúhelník (Equilateral triangle)

The most perfect geometric figure.

Very popular in baroque period.

Among both scholars and artists. Especially mathematicians, theologians and architects.

The equilateral triangle as a symbolic phenomenon in the ground plan and spatial concepts of leading European and Czech Baroque architects. Original objects sometimes extending into mystical planes.

Hexagrams (six-pointed geometric star figures) as seals of wisdom and mystery.

Borromini, Rainaldi, Guarini, Mathey, Santini. Sacred buildings as divine signs in the Baroque landscape.

Kircher's philosophical concepts of the universe and the mystagogical interpretations of the Rosicrucians.

## **Emil Simeonov (FH Technikum Wien)**

### Some issues in primary school mathematics

The 10-omat and the 100-Net are new low-tech hands-on tools for mathematics in primary school.

The 10-omat might be considered as the simplest version of Schickard's calculator.

The talk will highlight some interesting mathematical issues which arose from the writing of support materials for these tools:

- necessary prerequisites for learning a place value system
- a possible interpretation of Zero as an ordinal number
- a recursive construction of traditional number representation without assigning the traditional place value
- a structure which is something like a discrete one-dimensional affine space.

## **Adéla Svobodová (MU Brno)**

### Geometrical imagery in the work of Martianus Capella

Martianus Capella's work *De nuptiis Philologiae et Mercurii* from late antiquity is not interesting only in the literary sense, but also serves as a remarkable testimony to the contemporary understanding of mathematics through the eyes of a non-mathematician. The seven liberal arts are introduced successively in the work. The individual arts come forward in a personified form and describe their content. Geometry and Arithmetic are among the arts, and they will be the topic of this talk.

The entire story takes place at the wedding feast of the god Mars and his bride Philology, who receives the seven arts as a wedding gift. Each of the seven liberal arts is first described in terms of its appearance, attributes, and the impression they make on the Celestials. The first part of this talk will focus on the literary description of the personified Geometry and Arithmetic. The next part will focus on the content that each of them explain to the Celestials. Attention will be paid to how little geometry, in today's sense, is described by Geometry and what is the reason for that. On the other hand, geometry was essential for the ancient arithmetic, and therefore infiltrated a bit the presentation of Arithmetic. Special attention will be given to the mistakes that Martianus Capella made in his interpretations, and that affected the level of his didactic work. Capella used his sources to the maximum. The most important for him were the works of Euclid and Nicomachus of Gerasa. However, as it turns out after careful analysis, Capella often misunderstood his sources, and his work therefore contains many scholarly misrepresentations and errors.

## Václav Votoupal (VSB–TU Ostrava)

### Rudolf Skuherský (1828–1863): první profesor deskriptivní geometrie na pražské polytechnice

Growth of the industrial production caused the need of technically educated workers in the Czech Lands at the end of XVIIIth century. As a result, the Prague Polytechnic was established as the first technical high school in the Czech lands. In this paper, we discuss the beginnings of Descriptive Geometry at the Prague Polytechnic. In particular, we describe the career of Rudolf Skuherský (1828–1863), the first full professor in the field.

We discuss his works in illustrative imaging methods, emphasize his role as the founder of the Czech geometric school and his influence on the teaching of Descriptive Geometry in the *Realschulen* and *Realgymnasia*.

His work aims for the emancipation of Czech cultural and scientific life as an essential part of the so-called National Revival. We review his first Czech lectures and his cooperation with Dominik Ryšavý (1830–1890) on Czech terminology and the first Czech textbooks in Descriptive Geometry.

This workshop is a part of the series *Mathematics and Society*,

<https://math-and-society.webnode.page/>



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