Editorial: On modern mathematical modelling and optimisation methods

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Mathematics is one of the oldest sciences (Abdumanonov and Yusupova, 2023; Pisano and Bussotti, 2014). It has gone through a long and resultful path of development. In fact, this development is inextricably linked with the development of humanity itself, its views on the surrounding world and the comprehension of the essence and laws of the universe.

Modelling has been a powerful tool for human cognition of the world around us throughout the history of human development (Chatterjee, 2021; Klein et al., 2025). A man cannot comprehend the essence of phenomena in all its depth and diversity. Therefore, he resorts to models of real objects and phenomena (Giere, 2004; Hanchour and Benahmed, 2023; Johansson, 2016). He operates with models, gains new knowledge and, ultimately, complicates these models. Thus, through the efforts of Newton, Galileo and other great scientists, classical mechanics arose (Krishnaswami, 2024). Then the accumulated knowledge allowed Albert Einstein to create the foundations of relativistic mechanics (Stefanovich, 2024). There are many such examples. Therefore, it can be said that the process of human cognition of the essence of phenomena can be fairly considered as a complication of the models of real objects and phenomena that he operates with. At the same time, modelling as a tool of cognition requires a creative approach and the art of mastering this approach.

Mathematical modelling is referred to as symbolic modelling (Andrews et al., 2024). It is considered to be one of the most effective and frequently used methods of scientific knowledge. And this is no coincidence. Mathematical modelling as a method of scientific knowledge is progressing and improving at a rapid pace. Indeed, the geocentric model of the world by Claudius Ptolemy seemed extremely cumbersome due to the need to manually calculate the motion of the planets by deferents and epicycles. By the end of its use, 84 epicycles were involved in modelling the motion of Saturn. Johannes Kepler spent five years selecting the trajectory of Mars based on observation data. At the same time, he already used the simplest mechanical Schickard machine to carry out calculations. Felix Hausdorff developed the theory of fractional dimension in 1919 (Zhikharev, 2018). However, it had no practical application due to the cumbersome calculations before the invention of the computer.

The emergence and improvement of computer technology has brought mathematical modelling to a qualitatively new level. Many researchers talk about the information revolution (Wu, 2022; Kidwell, 2001; Rayward, 2014). And indeed it is, Benoit Mandelbrot introduced the term fractal in 1975 based on the theory of fractional dimension (Mandelbrot, 1982). Fractal models are now used very widely (Kryvko et al., 2025; Sedelnikov, 2012; Mikheev et al., 2024). Moreover, the concept of a computational

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experiment appeared (Maes, 1987; Zakharova et al., 2021; Chen and Chung, 2023; Martin et al., 2024). The natural experiment was relegated to the background (Lehrer et al., 2001). Although it has not lost its significance at all (Franklin, 2007; Sedelnikov et al., 2018; Boonrath et al., 2024). However, conducting a natural experiment is extremely difficult or even impossible in some areas of knowledge (Xue et al., 2024; Sauerbruch, 2022). Therefore, the computational experiment based on mathematical modelling gave a powerful impetus to the development of these branches of knowledge.

The development of computer technology has significantly expanded the horizons of mathematical modelling. Artificial intelligence systems (Kovač, 2025; Sergeev, 2022; Karaca and Baleanu, 2022), cognitive computing (Wang, 2009; Hazra et al., 2024; Kaufman et al., 2024), genetic algorithms (Chauhan et al., 2024; Zhang et al., 2025; Kurkin et al., 2024), fuzzy logic (Saatchi, 2024; Körpeoğlu et al., 2025; Sagar et al., 2025), and fractional systems (Nayak et al., 2023; Astashkin and Lykov, 2024) are currently developing rapidly. Every day, significant results are obtained that can develop a man's views on the world around him through the tool of mathematical modelling.

One of the important components of such development is the ability to quickly publish the results of your work and discuss them with the scientific community. The results of each researcher's work should contribute to the treasury of knowledge of human civilisation. This is the position of the editorial board of the *International Journal of Mathematical Modelling and Numerical Optimisation* (*IJMMNO*). The editorial team invites researchers to present their important scientific results in the form of original unpublished papers, reviews, and analytical overviews. We are ready to help authors improve the quality of their work, promote this work in the scientific community, and facilitate a broad discussion of scientific results. At the same time, authors have the widest possible publication opportunities. The journal supports both a free publication format for authors and open access. Authors themselves choose the most suitable format for their publications. Of course, open access allows the widest possible range of readers to be acquainted with the results of your work. This increases the citation rate of the work and the depth of its discussion. Particular attention in the journal will be paid to review papers. The accumulated knowledge and experience allow leading researchers to generalise them, make forecasts for future development, and discuss unsolved problems.

We are waiting for works devoted to any field of knowledge. Mathematical modelling is a universal tool today, without which no branch of knowledge can do. The main attention will be paid to regular issues of the journal. However, special issues will also be welcomed. Especially if it is a discussion of some specific problem. We hope that the journal will be useful for both researchers and readers. The journal team wishes all authors creative success and expects interesting materials from them for publication.

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