

# Preface

This is a short course of natural-sciences content intended for mathematicians. It has a potential for further development in different directions.

Here I present something from the legacy of Galileo, Newton, Euler, Bernoulli, Carnot, Clausius, Boltzmann, Gibbs, Poincaré, Einstein, Planck, Schrödinger, Carathéodory, Kolmogorov, Kotel'nikov, Shannon, and others.

Certainly, the title "Mathematical Analysis of problems in the Natural Sciences" reflects only a trend rather than a promise of any universality, like "everything, at once, and for free". The selection of the three subjects for the book is very conditional.

Note that those who are held in particularly high esteem by us, mathematicians, such as Archimedes, Newton, Leibniz, Euler, Gauss, Poincaré, were not mere mathematicians, but also scientists, natural philosophers.

In mathematics, solving concrete problems and creating abstract general theories are inseparable processes, like inhaling and exhaling. A prolonged violation of a balance between them is extremely dangerous. One should avoid getting into a position of a fisherman who enthusiastically pulls the fishing line and continues fishing on an ice floe that is already drifting away from the shore.

As Hermann Weyl noted, "a truly realistic mathematics should be, in conjunction with physics, a part of theoretical construction of a unified real world". By the way, this unity of physics and mathematics is still reflected in Russian diplomas of Candidates<sup>1</sup> and Doctors of Mathematical and Physical Sciences.

In conclusion I should like to thank all those who have helped with the proof reading of the original text, especially V.I. Arnold, who did not skip a single paragraph of the hundred-page print-out<sup>2</sup> and made a large number of incisive observations accompanied by comments.<sup>3</sup> If I have not taken into account all remarks or wishes of colleagues here, then this does not mean that I have ignored them; rather, I regard them as a subject of further deliberations and discussions.

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<sup>1</sup> *Translator's note:* The Kandidat degree is roughly equivalent to a Ph.D. and the Doktor degree is roughly equivalent to a D.Sc.

<sup>2</sup> This is no exaggeration: the file intended for V.I. Arnold was accidentally sent to the printer which systematically replaced some letters from Cyrillic to something different (sometimes with quite amusing results). And Arnold also corrected all these printing errors.

<sup>3</sup> For example, that the arguments in Part I are 'obscurantist'. With regard to this I should alert the reader. See also the footnote on p. 19.





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