



MONOGRAPHS

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Asymptotic Methods - New Perspective of Knowledge

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SUMMARY



This monograph consists of five chapters and references.

In Chapter 1 an overview and a historical background are given. The following perturbation technique variants are discussed: Lagrange, Laplace, Van der Pol, Poincaré, Krylov, Krylov-Bogolubov-Mitropolskiy methods and the equivalent linearizations. In addition, the analysis of dissipative non-autonomous systems and the asymptotic series with respect to different scales are addressed.

Chapter 2 includes the present state of perturbation techniques and their development perspectives. First, a general methodology devoted to application of the asymptotical methods is outlined and also the problems related to the asymptotical series convergence are illustrated. It is shown that depending on the purposes either the asymptotic splitting is analysed or asymptotic continualization can be applied. In the latter case instead of a large number of ordinary differential equations (describing, for instance, chain oscillators dynamics) one partial differential equation can be used. A special attention is paid to Padé approximations, asymptotic reduction and asymptotic continualization. The advantages and disadvantage of asymptotic approaches are also discussed.

Chapter 3 focuses on the impact of asymptotology on physics. Starting from Aristotle and Newton, via Einstein's theory a reader is invited to trace recent asymptotology developments in the field of classical and quantum mechanics. In addition, an asymptotical vision of our physical nature is illustrated.

Chapter 4 traces an impact of asymptotology on other fields like astronautics, applied sciences, biology and medicine, atmosphere and ocean investigations, psychology, physics of polymers and mechanics. General remarks are included in Chapter 5.

This book is meant for students of Mechanical, Electrical and Civil Engineering as well as those of Applied Mathematics and Technical Physics, and for all researchers interested in the application of perturbation techniques.

[Preface & Contents](#)

Book Review