BOOK REVIEW

More or less the reviewer shares the author's statement with which he starts the *Preface*, that this book with its almost 1 400 pages is unique among the comparable treatises in the breadth and the depth of the covered material. Since that place the author initiate a heart-to-heart talk on philosophy of teaching of mechanics and the social aspects of the professional societies.

The main motivation for the book should be looked at advocated here clear distinction between analytical mechanics of Lagrange and that one which the author calls also analytical but momentum founded by Euler. It is designed for peoples who are not interested just in collection of particular problems but are eager for a real understanding of the fundamental principles.

Specifically, the *Introduction*, presents a brief history of theoretical mechanics, gives suggestions to the readers and a list of symbols and notation, abbreviations, and basic formulas.

Chapter one - *Background*, introduces vector and tensor algebra, basic concepts and equations of Newton-Euler mechanics of particles and rigid bodies. Geometry of rigid body motion and kinematics and geometry of rotation motions are considered in details.

Chapter two - *Kinematics of Constrained Systems*, i.e., Lagrangean kinematics, introduces the theory of constrained systems and the classification of constrains. The holonomic and nonholonomic constraints are presented.

Together with the third Chapter - *Kinetics of Constrained Systems*, i.e., Lagrangean kinetics, they both are the most important chapters in the book. Here, the fundamental principles of the analytical mechanics are included, that is, those of d'Alembert-Lagrange and relaxation of the constraints; the central equations of Hamel; equations of motion with or without reactions, with or without multipliers,

in true or quasi system variables; an introduction to servo constraints (theory of Appel-Beghin *et al*); and rigid-body applications.

Chapter four - *Impulsive Motion* concerns impulsive motion via quasi variables.

The next chapters 5-8 are dedicated entirely to the nonholonomic mechanics, namely Chapter five - *Nonlinear Nonholonomic Constraints*. Chapter six - *Differential Variational Principles, and Associated Generalized Equations of Motion of Nilsen, Tzenov*. Chapter seven - *Time-Integral Theorems and Integral Principles*. Chapter eight - *Introduction to Hamiltonian/Canonical Methods*: *Equations of Hamiltonian and Routh; Canonical Formalism*.

It is worth to mention here, that the author has presented all known equations of motions in nonholonomic mechanics. Most of the existing books and papers in analytical mechanics and specially in nonholonomic mechanics, independently of the language they are written, are referred in the book. If I had this volume 40 years ago, I would not buy many books in the area of nonholonomic mechanics and would safe a lot of money and space at my home and my Institute office.

Here is the place to notice the fact that the achievements of the Bulgarian scientists Dolapchiev and Tzenov in the field of the non-holonomic mechanics are not omitted as it was the usual practice of the modern writers on the subject.

Regarding technicalities - the students and the young scientists will find a lot of interesting examples and solved up to their very end problems.

Dear reader, I recommend you to read this special book in analytical mechanics.

The only remark that I have at the moment is about the Kepler problem. The Kepler name itself is mentioned only in passing on page 469 in a way which is not enough.

As the author himself wrote the book is a classical and detailed introduction to advanced analytical mechanics but our opinion is that it is also a nice treatise on the dynamics of constrained mechanical systems with a finite number of degrees of freedom. It as an useful tool to undergraduate and graduate students, professors and researchers in the area of applied mechanics, engineering science, and mechanical, aerospace, and structural engineering, as well for the physicists and applied mathematicians.

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