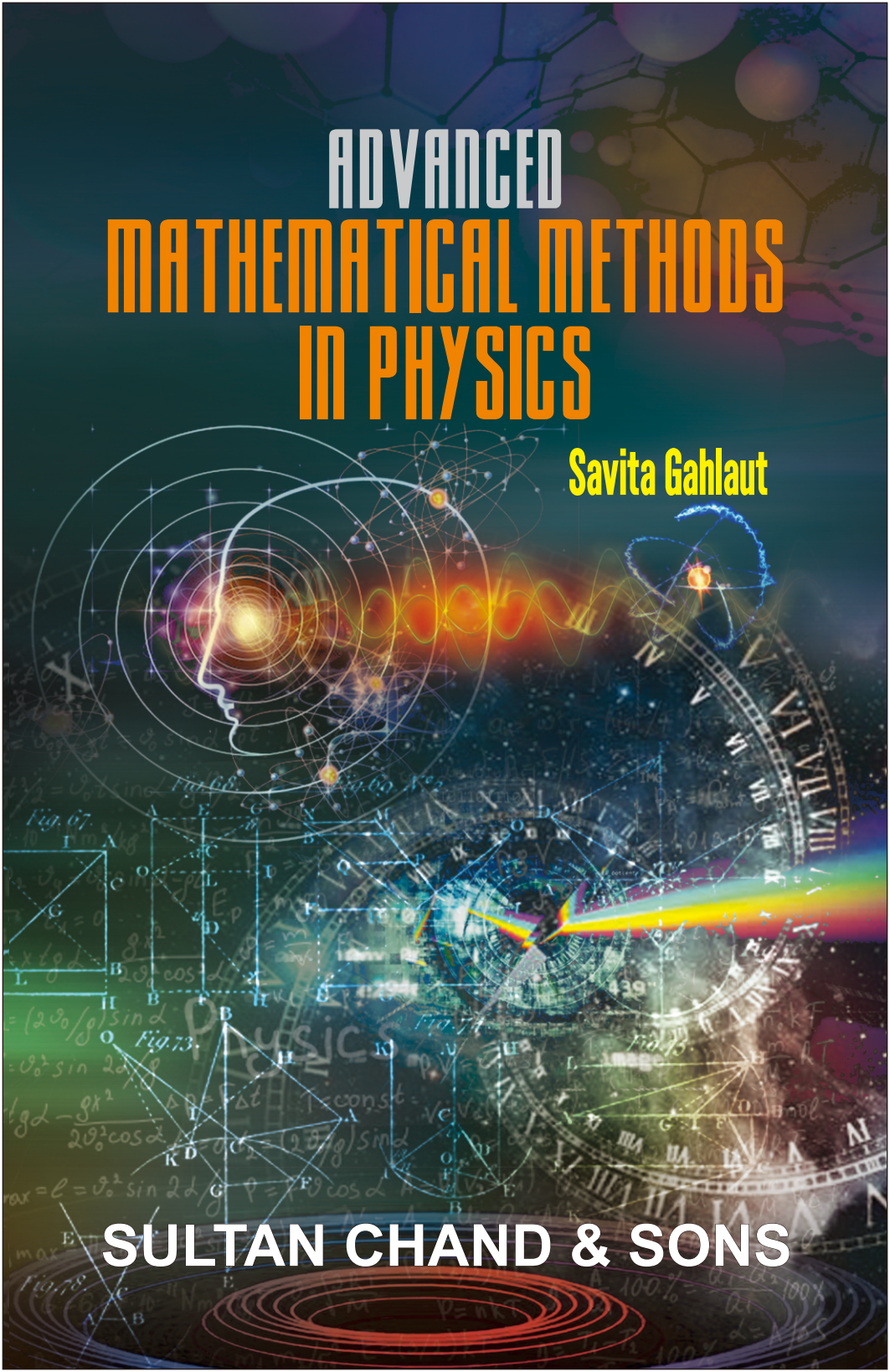
ADVANCED MATHEMATICAL METHODS IN PHYSICS

Savita Gahlaut



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Advanced Mathematical Methods in Physics

To
Maa
Naresh
Kshitiz
&
Arahan
the four pillars of my life

Advanced

Mathematical Methods in Physics

Savita Gahlaut

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Preface

The mathematical concepts are an absolute necessity for physics students. Various mathematical methods are used to understand, study and develop new theories in all the branches of Physics. In this book some advanced mathematical concepts are explained with examples. All the topics covered in the book are explained considering the requirements of Physics students.

The book is aimed for the Honours and Post graduate syllabi of the Indian universities. It is developed as a textbook for the undergraduate and postgraduate students of physics. The topics covered in the book are equally important for the engineering students too. The research student will also find it useful as a quick reference book.

The book is a result of teaching the topics, covered in the book, for about 10 years. Each topic is explained from the basics to make it a self sufficient book. As the book is primarily meant for physics students, it do not have too many theorems as are found in mathematics books which makes the subject dull. Each concept in the book is explained with the help of examples, solved problems and applications in physics. At the end of each chapter more problems are given for practice.

The topics covered in the book are a part of the syllabi prescribed in different Indian Universities. Matrices, vector Spaces, Linear transformations and Cartesian Tensors are also a part of the syllabus of undergraduate Engineering courses in various Technical Institutes and Universities.

The book is based on the syllabus of the paper 'Advanced Mathematical Physics-I' and also covers Group theory which is a part of the paper 'Advanced Mathematical Physics-II' taught to the 3rd year students of B.Sc(H) Physics, Delhi University. I have been teaching these topics for about 10 years and found that students as well as teachers have not been able to find a book which satisfactorily fulfills the requirements of courses in Physics. Most of the books on these topics are meant for Mathematics students which Physics/Engineering students find difficult to relate to the problems of their field. Some books meant for Physics students discuss these topics briefly and do not give enough weightage required for applications in Physics. Moreover, there is not a single book in the market which covers all these topics in

sufficient details and teachers/students have to refer different books for different topics which are part of one paper.

I hope the readers will find the book helpful in understanding the concepts. Any suggestions to improve the book are welcome from the readers. I shall be thankful to one and all to bring to my notice any inadvertent mistakes in the book.

Dr. Savita Gahlaut

Contents

About the Book

Mathematical concepts are an absolute necessity for physics and engineering students. Various mathematical methods are used to study, understand and develop new theories in all the branches of physics. In this book some advanced mathematical methods are explained, keeping in mind the requirements of physics students. The book is aimed for the undergraduate and postgraduate physics students and engineering students. The research student will also find it useful as a quick reference book.

Salient Features

- Each topic is explained from the basics to make it a self-sufficient book.
- All the concepts are explained with the help of examples and solved problems.
- Unsolved problems are given at the end of each chapter for more practice.
- Applications of concepts in physics are discussed.

Dr. Savita Gahlaut is currently an associate professor at Deen Dayal Upadhayaya College, University of Delhi. She has a teaching experience of 25+ years at undergraduate level. She received her Ph.D in Physics from Delhi University. Her area of specialization is General Theory of Relativity and Cosmology.

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