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Nota di contenuto	1. Symmetry and the Role of Group Theory -- 1.1 Arrangement of the Book -- 2. Groups -- 2.1 Definition of a Group -- 2.1.1 Multiplication Tables -- 2.1.2 Generating Elements -- 2.1.3 Commutative Groups -- 2.2 Covering Operations of Regular Polygons -- 2.3 Permutations and the Symmetric Group -- 2.4 The Rearrangement Theorem -- 2.5 Isomorphism and Homomorphism -- 2.5.1 Isomorphism -- 2.5.2 Homomorphism -- 2.5.3 Note on Mapping -- 2.6 Subgroups -- 2.7 Cosets and Coset Decomposition -- 2.8 Conjugate Elements; Classes -- 2.9 Multiplication of Classes -- 2.10 Invariant Subgroups -- 2.11 The Factor Group -- 2.11.1 The Kernel -- 2.11.2 Homomorphism Theorem -- 2.12 The Direct-Product Group -- 3. Vector Spaces -- 3.1 Vectors and Vector Spaces -- 3.1.1 Mathematical Definition of a Vector Space -- 3.1.2 Basis of a Vector Space -- 3.2 Transformation of Vectors -- 3.3 Subspaces and Invariant Subspaces -- 3.4 Metric Vector Spaces -- 3.4.1 Inner Product of Vectors -- 3.4.2 Orthonormal Basis -- 3.4.3 Unitary Operators and Unitary Matrices -- 3.4.4 Hermitian

Sommario/riassunto

This book has been written to introduce readers to group theory and its ap- plications in atomic physics, molecular physics, and solid-state physics. The first Japanese edition was published in 1976. The present English edi- tion has been translated by the authors from the revised and enlarged edition of 1980. In translation, slight modifications have been made in. Chaps. 8 and 14 to update and condense the contents, together with some minor additions and improvements throughout the volume. The authors cordially thank Professor J. L. Birman and Professor M. Car- dona, who encouraged them to prepare the English translation. Tokyo, January 1990 T. Inui . Y. Tanabe Y. Onodera Preface to the Japanese Edition As the title shows, this book has been prepared as a textbook to introduce readers to the applications of group theory in several fields of physics. Group theory is, in a nutshell, the mathematics of symmetry. It has three main areas of application in modern physics. The first originates from early studies of crystal morphology and constitutes a framework for classical crystal physics. The analysis of the symmetry of tensors representing macroscopic physical properties (such as elastic constants) belongs to this category. The sec- ond area was enunciated by E. Wigner (1926) as a powerful means of handling quantum-mechanical problems and was first applied in this sense to the analysis of atomic spectra. Soon, H.