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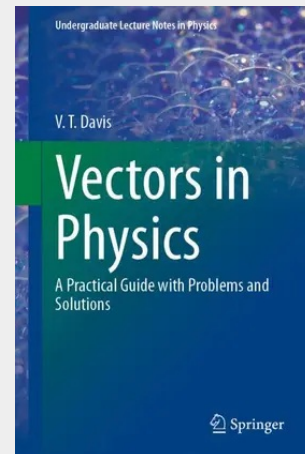
## Vectors in Physics

A Practical Guide with Problems and Solutions

This book provides a rigorous and comprehensive exposition of vectors and vector fields, designed for advanced undergraduate students in physics. It presents detailed derivations of essential vector identities, relations involving quantum vector operators, and vector calculus theorems commonly encountered in undergraduate and graduate physics coursework. A complete catalogue of vector identities—spanning both classical and quantum contexts—is presented using index notation and the Einstein summation convention, fostering fluency with tensorial methods and streamlining complex derivations.

Core topics include vector algebra, differential and integral vector calculus, and three-dimensional Taylor expansions, supported by careful treatments of the essential underlying mathematical tools. Advanced subjects—such as the Dirac delta function, Green's functions, multipole expansions, and Cartesian tensors—are introduced with a balance of formal clarity and pedagogical accessibility. A dedicated chapter on tensor transformations, invariants, and the Levi-Civita and Kronecker symbols offers a foundation for further study in areas such as general relativity and quantum field theory. Each chapter contains numerous worked examples and end-of-chapter problems, all accompanied by complete solutions, making the text well-suited for both structured coursework and independent study.

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