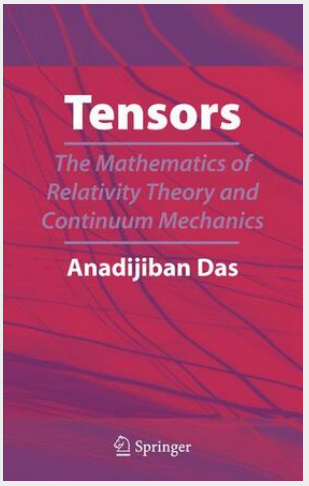
Das

Tensors

The Mathematics of Relativity Theory and Continuum Mechanics



Tensor algebra and tensor analysis were developed by Riemann, Christo?el, Ricci, Levi-Civita and others in the nineteenth century. The special theory of relativity, as propounded by Einstein in 1905, was elegantly expressed by Minkowski in terms of tensor ?elds in a ?at space-time. In 1915, Einstein formulated the general theory of relativity, in which the space-time manifold is curved. The theory is aesthetically and intellectually satisfying. The general theory of relativity involves tensor analysis in a pseudo- Riemannian manifold from the outset. Later, it was realized that even the pre-relativistic particle mechanics and continuum mechanics can be elegantly formulated in terms of tensor analysis in the three-dimensional Euclidean space. In recent decades, relativistic quantum ?eld theories, gauge ?eld theories, and various uni?ed ?eld theories have all used tensor algebra analysis exhaustively. This book develops from abstract tensor algebra to tensor analysis in va- ous di?erentiable manifolds in a mathematically rigorous and logically coherent manner. The material is intended mainly for students at the fourth-year and ?fth-year university levels and is appropriate for students majoring in either mathematical physics or applied mathematics.

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