<<数学物理的几何方法>>

图书基本信息

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前言

Why study geometry？
This book alms to introduce the beginning or working physicist to awide range of aualytic tools which have their or/gin in differential geometry andwhich have recently found increasing use in theoretical physics. It is not uncom-mon today for a physicist's mathematical education to ignore all but the sim-plest geometrical ideas, despite the fact that young physicists are encouraged todevelop mental 'pictures' and 'intuition' appropriate to physical phenomena.This curious neglect of 'pictures' of one's mathematical tools may be seen as the outcome of a gradual evolution over many centuries. Geometry was certainly extremely important to ancient and medieval natural philosophers; it was ingeometrical terms that Ptolemy, Copernicus, Kepler, and Galileo all expressedtheir thinking. But when Descartes introduced coordinates into Euclideangeometry, he showed that the study of geometry could be regarded as an appli.cation of algrebra. Since then, the/mportance of the study of geometry in theeducation of scientists has steadily declined, so that at present a university undergraduate physicist or applied mathematician is not likely to encounter much geometry at all.   One reason for this suggests itself immediately: the relatively simple geometry of the three-dimensional Euclidean world that the nineteenth-century physicist believed he lived in can be mastered quickly, while learning the great diversity ofanalytic techniques that must be used to solve the differential equations of physics makes very heavy demands on the student's time. Another reason mustsurely be that these analytic techniques were developed at least partly in response to the profound realization by physicists that the laws of nature couldbe expressed as differential equations, and th/s led most mathematical physicists genuinely to neglect geometry until relatively recently.   However, two developments in this century have markedly altered the balancebetween geometry and analysis in the twentieth-century physicist's outloook.The first is the development of the theory of relativity, according to which theEuclidean three-space of the nineteenth-century physicist is only an approximation to the correct description of the physical world. The second development,which is only beginning to have an impact.

内容概要

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