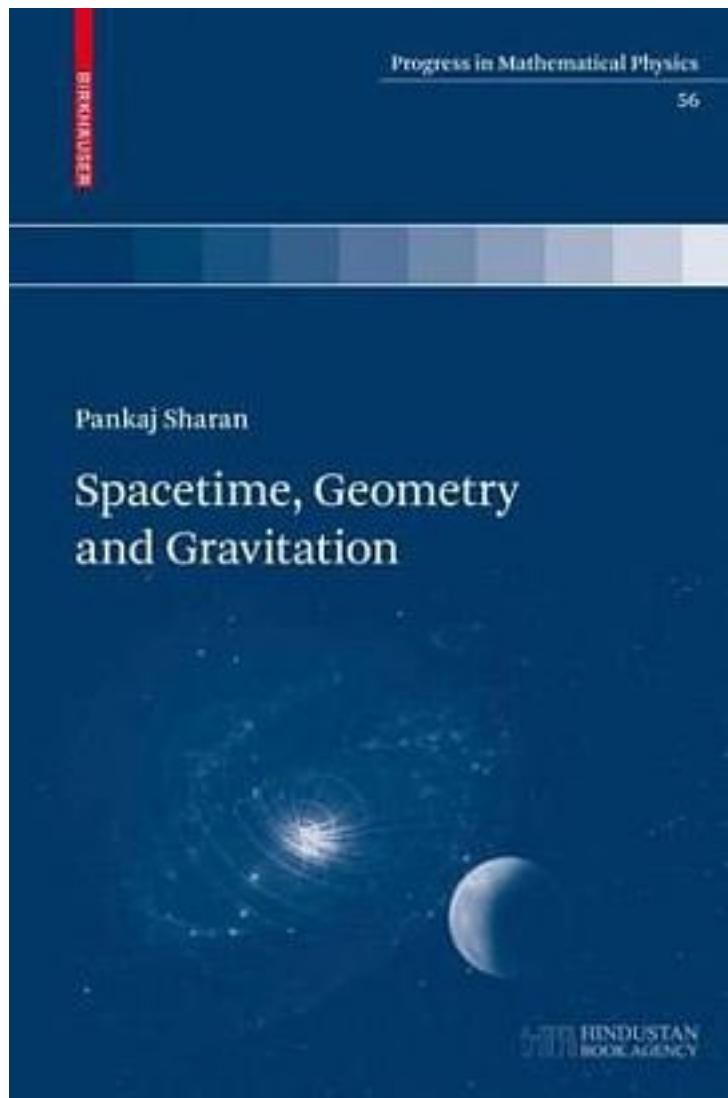


Spacetime, Geometry and Gravitation



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出版者:Birkhäuser Basel

出版时间:2009-10-23

装帧:Hardcover

isbn:9783764399702

Teaching Einstein's general relativity at introductory level poses problems because students cannot begin to appreciate the basics of the theory unless they learn a sufficient amount of Riemannian geometry. Most elementary books take the easy course of telling the students a few working rules stripping the mathematical details to a minimum while the advanced books take the mathematical background for granted. Students eager to study Einstein's theory at a deeper level are forced to learn the mathematical background on their own and they feel lost because pure mathematical texts on geometry are too abstract and formal. The present book solves this pedagogical problem in a unique way by dividing the book into three parts. Essential concepts of Riemannian geometry are introduced in Part I (four chapters) through Gauss's work on curvature of surfaces using only ordinary calculus. A first acquaintance with Einstein's theory can then be made. Only after this first brush with both physics and mathematics of relativity, a proper, detailed mathematical background is developed in the next six chapters in Part II. The third part then recaptures all the basic concepts of general relativity and leaves the student with a sound preparation for learning advanced topics. My aim has been that after learning from this book a student should not feel discouraged when she opens advanced texts on general relativity for further reading.

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