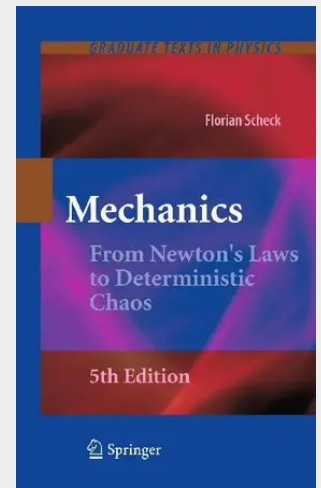


Mechanics

From Newton's Laws to Deterministic Chaos

Purpose and Emphasis. Mechanics not only is the oldest branch of physics but was and still is the basis for all of theoretical physics. Quantum mechanics can hardly be understood, perhaps cannot even be formulated, without a good knowledge of general mechanics. Field theories such as electrodynamics borrow their formal framework and many of their building principles from mechanics. In short, throughout the many modern developments of physics where one frequently turns back to the principles of classical mechanics its model character is felt. For this reason it is not surprising that the presentation of mechanics reflects to some extent the development of modern physics and that today this classical branch of theoretical physics is taught rather differently than at the time of Arnold Sommerfeld, in the 1920s, or even in the 1950s, when more emphasis was put on the theory and the application of partial-differential equations. Today, symmetries and invariance principles, the structure of the space-time continuum, and the geometrical structure of mechanics play an important role. The beginner should realize that mechanics is not primarily the art of describing block-and-tackles, collisions of billiard balls, constrained motions of the cylinder in a washing machine, or bicycle riding.

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84,98 €

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Lieferfrist: bis zu 10 Tage

Artikelnummer: 9783642260469
Medium: Buch
ISBN: 978-3-642-26046-9
Verlag: Springer
Erscheinungstermin: 14.03.2012
Sprache(n): Englisch
Auflage: Fifth Auflage 2010
Serie: Graduate Texts in Physics
Produktform: Kartoniert
Gewicht: 855 g
Seiten: 547
Format (B x H): 155 x 235 mm

