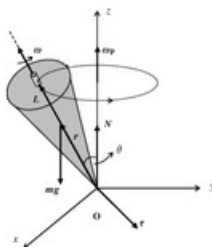


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Abstract

This book presents the basic principles of the Newtonian Mechanics at the undergraduate level. The author aims to focus the reader's attention on the key points of the theory and its applications. The subject matter of the book begins with the study of objects of Physics, physical quantities, units of measurement and their systems, as well as the properties and operations of vectors. Next, the presentation of kinematics begins, with the study of rectilinear smooth motion, rectilinear smoothly accelerated motion, and free fall. The study of movement in plane and space follows. The relative movement according to Galileo's transformations is also described. The dynamic view of movement follows, with the concept of force and the presentation of Newton's three laws. Types of forces such as weight, friction, and centripetal force are described in detail. Then the concepts of work, mechanical energy, and power are defined. The work-kinetic energy theorem and the conservation

of mechanical energy for conservative forces are presented. Next the definitions of momentum and impulse, as well as a description of the body collisions, are given. The principle of conservation of momentum and the concept of the center of mass are highlighted, while systems of variable mass are also studied. Then a detailed reference is made to the rotation of the solid body, initially with the kinematics of the rotation and then with the dynamics. A body's translational and rotational equilibrium conditions are given, while the mechanical properties of solids are briefly mentioned. Following is the study of oscillatory motions with a description first of the simple harmonic oscillation and later of the damped and forced oscillation. Gravity is presented as a fundamental force through the law of universal gravitation. The book ends with the study of fluids initially in their static state, and then with fluid dynamics for ideal but also real fluids.

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