MECHANICS AND ITS DEPARTMENTS. BASIC LAWS OF MECHANICS

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Mechanics [Greek mechanike (teche) - weapon, structure] is a science that studies the motion and balance of an object in space under the influence of an external force. Material point mechanics, point point system mechanics, absolute solid body mechanics, ground mechanics, and contact environment mechanics are all divided into dynamics, kinematics, and statics. The field of practical application of the laws of mechanics in the construction of machines, mechanisms and other structures is called practical (applied) mechanisms; The field of construction mechanics is the development of methods for calculating the strength and priority of structures and their parts.

Knowledge of mechanics has existed since ancient times. In the Neolithic and Bronze Ages, the wheel was known, and later richag, polispast, and others were used. The ancient Egyptian pyramids (3rd century BC), the surviving waterworks in Babylon, China, Khorezm, Sogdiana, and Iran, show that the ridges, ridges, and slopes were used in their construction. In Central Asia, wheelbarrows and ropes have long been used. Theoretical mechanics is believed to have originated in Greece (6-5 BC). Mechanical Problems is the oldest work on mechanics (3rd century BC). There is speculation that the author of this work is Aristotle. The geometric direction of statics is associated with the name of Archimedes (287-212 BC). Geronnkng's works "Mechanics", "Pneumatics", "About Automata", "Belo-poyika" belong to applied mechanics. Yevdoks Knidsky (4th century BC), Plato, Archimedes, Caliph, Apollonius, Pergayos, Hipparchus, and Ptolemy developed the rules of kinematics used. Further development of mechanical science dates back to the 9th-12th centuries. During this period, the scholars of the East, the Banu Musa (brothers), Thabit ibn Qurra, Abu Rayhan Beruni, Abu Abdullah Yusuf al-Khwarizmi, Abu Ali ibn Sina, Umar Khayyam, al-Hazini, Ahmad al-Farghani, made significant contributions to the development of mechanics. The development of mechanics in this period begins with the translation and interpretation of the works of Aristotle, Heron, Archimedes. In the 2nd book of Abu Abdullah Yusuf al-Khwarizmi's The Key of Science, a chapter is devoted to mechanics. Thabit ibn Qurra, in his book on Karastun, elaborated on the theory of weighing. Beruni, Umar Khayyam, and al-Khorini developed methods for determining the specific gravity of metals and precious stones. In the physics

section of Ibn Sina's Encyclopaedia, he gave an in-depth account of the movement. Kinematic models explaining the motion of stars are given in many treatises by Thabit ibn Qurra, Ibn Sina, and Beruni.

Mechanics flourished in Europe during the Renaissance. During this period, many new problems were posed to the science of mechanics, such as the force of impact, the theory of flight of shots, the endurance of ships, the vibration of pendulums, and other basic laws of theoretical mechanics. , G. Galileo, I. Newton's role was great. In theoretical mechanics, material points and mechanical systems (eg, absolute solids) are taken as material objects. The concepts of space, time and time, force and mass, the inertial frame of reference, and variable environments are the basic concepts of theoretical mechanics. Galileo - Newton's law of inertia, the equation of motion (Newton's second law), the law of equality of effects and repulsions (Newton's third law) are the basic laws of theoretical mechanics. From these laws in the study of the motion of mechanical systems J. L. Lagranjnit first and second type equations, U. R. Hamiltonnmt canonical equations, Hamilton-Jacobi equation, Ap-pel equations, general theorems of dynamics are derived. Also, K. F. Gaussshtt's principle of small directions, Hamilton, B. S. Jacobi, L. Euler and Monertyun's principles of variation are the main principles of M. The theory of motion priority (stability) is one of the most important areas of theoretical mechanics in celestial ballistics and celestial mechanics.

The theory of motion priority is the basis of automatic control techniques (aircraft and rocket, spacecraft flight control). This theory shows the conditions of motion priority, ways to increase the priority properties of technical systems, and in celestial ballistics calculates the temperature vector of motion of spacecraft.

In applied mechanics, the methods of controlling the motion of a mechanical system are considered on the basis of the general laws and principles of theoretical mechanics, and the ways in which a mechanical system acquires an appropriate property are determined. Applied mechanics play an important role in the control of control systems. The objects of control were mechanical objects, self-propelled and flying machines (ships, airplanes, rockets and helicopters), various machines (machines, turbines, electric and electronic machines, combustion and rolling machines) and test mechanical devices, adjusters, jet engines and others. .

The motion of deformable solids and gaseous liquids is studied in the mechanics of contiguous media. The theory of elasticity and plasticity, hydrodynamics and

aeromechanics, gas and wave dynamics are the most advanced fields of the mechanics of contact media. In the mechanics of contiguous media, the structure of solids, liquids, and gases is considered to be a continuous structure, and each element of the volume of the contiguous medium interacts with neighboring elements. Magnetic hydrodynamics, aeroelasticity theory and cracking theory are areas of mechanics of contact media.

The motion of various bodies in space is studied by a special branch of physics - mechanics. The second, in turn, is divided into kinematics and dynamics. In this paper, we consider the laws of mechanics in physics, focusing on the dynamics of translational and rotational motion of bodies.

Newton's laws of mechanics are the three laws that form the basis of classical mechanics. Described by I. Newton (1687). The first law is that any body maintains its state of rest or linear motion until an external force acts on it (see Law of Inertia). The second law is that the change in the amount of motion (the product of the acceleration with the mass of the body) is proportional to the force acting on the body and the direction. The third law is that the forces of interaction between two bodies are equal and the directions are opposite (see Law of Impact and Reaction). Newton's laws of mechanics. It emerged as a result of many observations, experiments, and theoretical studies conducted by Newton himself in G. Galilei, H. Huygens, and R./ukham. Newton's laws of mechanics do not apply to elementary particles and substances whose velocities are close to the speed of light. The phenomena of a system moving at high speed cannot be explained by the laws of classical mechanics. These phenomena are considered in the relativistic mechanics of A. Einstein. The phenomena of the atom and the nucleus are presented in quantum mechanics, which deals with the methods of converting mechanical problems into mathematical problems. But not all problems of mechanics can be solved mathematically. In such cases, the problems are roughly solved on the basis of various mechanical hypotheses and intuitions. Under the influence of mechanics, a number of branches of mathematics developed.

Mathematics has played an important role in identifying similarities between some branches of the theory of functions of complex variables, the theory of special product equations, and other problems in physics and mechanics. For example, the similarity between the pendulum in mechanics and the contours of vibration in physics is one of them. Many problems in mechanics are related to the motion of plasmas in a magnetic field (magnetic hydrodynamics). Many

important issues in hydrodynamics are related to the problems of high speeds in aviation, ballastics, turbocharging, and engine building.