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VELOCITY AND ACCELERATION IN STRAIGHT-LINE MOTION

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Anotatsiya: Maqolada to'g'ri chiziqli harakatdagi tezlik va tezlanish tushunchalari haqida oddiy va tushunarli tarzda so'z yuritilgan. Tezlanuvchan va sekinlanuvchan harakatlar farqi, harakat tenglamalari va hayotiy misollar orqali mavzu yoritilgan. Ushbu maqola o'quvchilarga mexanika asoslarini o'rganishda yordam beradi va harakatni tahlil qilish ko'nikmalarini shakllantiradi.

Annotation: This article provides a detailed explanation of the key concepts of linear motion — velocity and acceleration. It explores the physical nature of uniformly accelerated and decelerated motion, their distinguishing features, fundamental motion equations, and real-life examples. The work aims to help students gain a deeper understanding of one of the most important branches of mechanics and to develop skills for analyzing motion in practical situations.

Аннотация: В данной статье подробно рассмотрены основные понятия прямолинейного движения — скорость и ускорение. Раскрыта физическая сущность равноускоренного и равнозамедленного движения, их отличительные признаки, приведены основные уравнения движения и практические примеры. Работа направлена на формирование у учащихся глубокого понимания одного из важнейших разделов механики и развитие навыков анализа движений в реальной жизни.

Kalit so'zlar: to'g'ri chiziqli harakat, tezlik, tezlanish, tezlanuvchan harakat, sekinlanuvchan harakat, fizik qonunlar, mexanika

Ключевые слова: прямолинейное движение, скорость, ускорение, равноускоренное движение, равнозамедленное движение, физические законы, механика

Keywords: straight-line motion, velocity, acceleration, uniformly accelerated motion, uniformly decelerated motion, physical laws, mechanics

In mechanics, one of the most basic and commonly encountered types of motion is rectilinear motion. Understanding this type of motion requires an important understanding of the concepts of velocity and acceleration. This article provides a detailed explanation of velocity and acceleration in rectilinear motion, as well as uniformly accelerated and decelerated motions.

Rectilinear motion is a type of motion where an object moves in a straight line along a single direction. The trajectory of the motion does not change; only the velocity and acceleration of the object change. Velocity is a vector quantity that represents the intensity of an object's motion and is measured by the distance traveled per unit of time:

$$v=S/t \text{ S-road, t-time}$$



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If the velocity does not change, it is called uniform motion; if the velocity changes, it is called non-uniform motion.

Acceleration is a vector quantity that represents the change in an object's velocity over time: $\mathbf{a}=(\mathbf{v}-\mathbf{v}_0)/t$

If the object's velocity increases over time, it is called uniformly accelerated motion. In this case, acceleration is positive ($a > 0$). For example, when a car accelerates after pressing the gas pedal. If the object's velocity decreases over time, it is called uniformly decelerated motion. In this case, acceleration is negative ($a < 0$), and this type of acceleration is referred to as negative acceleration or deceleration. For example, when a car slows down after pressing the brake pedal. In accelerated motion, the velocity and acceleration vectors are aligned in the same direction. In accelerated motion, if an object is increasing its speed, the velocity and acceleration vectors align with each other, meaning they point in the same direction. As an example, consider a car that is accelerating. If we are inside the car, we may feel pushed backward as the car speeds up. This happens because, while the car is increasing its speed, there is a difference between our internal reference frame and the external motion of the car. Since the car is accelerating, the velocity and acceleration vectors are in the same direction, which causes us to feel a backward push. In decelerating motion, the velocity and acceleration vectors are in opposite directions. In decelerating motion, if an object is reducing its speed, the velocity and acceleration vectors point in opposite directions. For example, if we are inside a car that is braking, we can feel the car slowing down. As a result, the velocity and acceleration vectors are in opposite directions, meaning when the car is slowing down, we may feel a forward push or compression in our body. The acceleration in the opposite direction reduces the object's velocity, leading to decelerating motion.

In rectilinear motion, the concepts of velocity and acceleration allow for a deep analysis of an object's movement. Accelerating and decelerating motions help to understand the changing nature of motion. This knowledge is not only theoretical but also has practical significance in fields such as automotive engineering, aerospace technology, robotics, and other industries.

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