Study of Physics

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Abstract

This article was written for the purpose of documenting my process of studying physics.

1 Classical mechanics

1.1 Introduction

Just like every other "Physics documentation", this document starts with the field of mechanics. In this part we will focus on Classical mechanics. Classical mechanics is the area of physics concerned with the relationships between force, matter and motion among physical objects. This branch of physics has its origins in Ancient Greece, for instance, in the writings of Aristotle and Archimedes. Classical mechanics further breaks down to the sub topics of Dynamics, Kinematics, Continuum, Kinetics, Statistical, Celestial and Statics.

1.2 General properties and units

These properties and units are important for every branch of classical mechanics. First of all everything around us that we perceive in any kind of way, for instance, a cube out of stone is a physical object (*Ger. Körper*). Every physical object has a fix amount of properties. (The stone cube has a mass, takes up a certain amount of space, etc.)

1.2.1 Volume, mass and density

Volume, mass and density are three important physical quantities.
The Volume is a scalar quantity expressing the amount of three-dimensional spaced enclosed by a closed surface. For example, the space that the stone cube occupies. It can be usually measured using tools (like flow meters, etc.). For expressing the volume we use the symbol V and the units litre l, or cubic metre m^3.

$$1m^3 = 1000l$$

Mass is the quantity of matter in a physical body. Unlike the weight of an object, the mass of a specific object is the same everywhere (The stone cube has a mass of 1kg on the earth, on the mass, etc.). Mass has the symbol m and the unit kilogram kg. Mass can be measured using a scale. In an closed system, under the assumption of classical physics, the sum of all masses stays constant (Conservation of mass).

$$m = \sum_{i=1}^{n} m_i = constant$$

The density of a substance is its mass per unit volume. The symbol most often used for density is ρ (the lower case Greek letter rho). Mathematically, density is defined as mass divided by volume.

$$\rho = \frac{m}{V}$$

Thus the unit for density is kilogram per cubic metre $\frac{kg}{m^3}$. Every substance has a defined constant density.