

2.1: Introduction to Newtonian Mechanics

It is assumed that the reader has been introduced to Newtonian mechanics applied to one or two point objects. This chapter reviews Newtonian mechanics for motion of many-body systems as well as for macroscopic sized bodies. Newton's Law of Gravitation also is reviewed. The purpose of this review is to ensure that the reader has a solid foundation of elementary Newtonian mechanics upon which to build the powerful analytic Lagrangian and Hamiltonian approaches to classical dynamics.

Newtonian mechanics is based on application of Newton's Laws of motion which assume that the concepts of distance, time, and mass, are absolute, that is, motion is in an inertial frame. The Newtonian idea of the complete separation of space and time, and the concept of the absoluteness of time, are violated by the Theory of Relativity as discussed in chapter 17. However, for most practical applications, relativistic effects are negligible and Newtonian mechanics is an adequate description at low velocities. Therefore chapters 2 – 16 will assume velocities for which Newton's laws of motion are applicable.

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