

Particle Dynamics: Modelling and Solutions

In the general discipline of engineering mechanics, dynamics is an important area, which provides us with tools, methodologies and techniques that help us to understand the various complex motion scenarios that we encounter all around us. In this regard, it is found that while the entities that undergo various motion profiles can be of many different shapes and sizes, it is possible to simplify their representation in the form of a particle for modelling their motion profiles, which has given rise to the field of particle dynamics.

Particle dynamics discipline aims to solve for complex motion scenarios by assuming that the overall dimensions of the bodies are small in comparison to the curvature of the trajectories and paths that they describe. This assumption is further justified by assuming that bodies are also rigid i.e., the inter-particle distances within the body are invariant during the time interval in which the motion of the body evolves. It is to be noted here that the above assumptions are generally applicable in the context of a large class of problems in the area of dynamics and, hence, we find that the discipline of particle dynamics is an important tool to understand and create many practical motion profiles using relatively simpler solution methodologies, for complex geometrical entities.

The present short course is intended as an introductory material with regard to the study of particle dynamics, including basic mathematical modelling tools and solution techniques. The participants can expect to acquire basic knowledge about various motion scenarios and applicable frames of reference, which have practical applications. The course is of twelve hours duration and is delivered over six weeks.