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Lagrangian Mechanics

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Superiority of Lagrangian Mechanics over Newtonian Mechanics

The equations of motion involve vector quantities like force ,momentum etc
which increases complexity in solving the problems in Newtonian mechanics.

This approach also cannot avoid constraints present in a problem .

These forces of constraints , if not known, make the solution of the problem difficult and even they are known .

- The use of rectangular or other commonly used coordinates may be make the solution of the problem to be impossible .

- These drawbacks are removed in Lagrangian mechanics , Where the technique involves scalars , like potential and kinetic energies instead of vectors .

The use of generalized coordinates in Lagrangian formulation often allows automatically for constraints .

In this formulation, the difficulty in solving the problems is many times reduced,

when any quantities like momentum is taken as generalized coordinate instead of rectangular or commonly used coordinates.

Further the form of the Lagrange's equation of motion invariant under any generalized coordinate transformation.

Lagrangian function (L) :

Lagrangian function L of a system is given by

$$L = T - V$$

In order to form Lagrangian L , Kinetic Energy T and

Potential energy V are to be written in generalized coordinates

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