PHYS2113 Classical Mechanics

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Contents

1 Introduction to Lagrangian Mechanics

1.1 Action

Definition 1.1 (Action) *Action, termed A, is defined as*

$$A = \int_{t_0}^{t_1} L \, \mathrm{d}t. \tag{1}$$

Where $L(q, \dot{q}) = T - V = \frac{1}{2}m\dot{q}^2 - V(q)$ *is what we call the Lagrangian.*

Note that action represents the integral over time of the Lagrangian which can be thought as the motion of the object at some point of time.[1]

1.2 The Euler-Lagrange Equation

Definition 1.2 (The Euler-Lagrange Equation) *The Euler-Lagrange equation for a system with a single degree of freedom is*

$$\frac{\mathrm{d}}{\mathrm{d}t}\frac{\partial L}{\partial \dot{q}} - \frac{\partial L}{\partial q} = 0.$$

1.2.1 Example

Refer to Taylor's[1] **Example 6.2** on page 222.

[1] The book 'Classical Mechanics' By John R. Taylor

References

[1] *Action (physics)*. en. Page Version ID: 1020785959. May 2021. URL: https://en.wikipedia.org/w/index.php?title=Action_(physics)&oldid=1020785959 (visited on 05/31/2021).