

Lagrangian Mechanics

Pugazharasu A D

August 21, 2020

Abstract:

”In this talk we’ll explore the principles of ‘Lagrangian Mechanics’, a few toy models, the deeper significance and symmetry that hides behind it. We’ll follow this talk with a discussion of further examples and problems to be solved over discussion sessions.”

Overview

- 1 Introduction
- 2 Hamilton's Principle
- 3 Euler-Lagrange Equation
- 4 Generalized Coordinates
- 5 Configuration Space
- 6 Rewriting Lagrange's Equations
- 7 Lagrange's Equations with Undetermined Multipliers
- 8 Equivalence of Lagrangian and Newtonian Dynamics
- 9 Essence of Lagrangian Dynamics
- 10 A Theorem About Kinetic Energy
- 11 Conservation Theorems Revisited
 - Conservation of Momentum
 - Conservation of Angular Momentum
 - Conservation of Energy

Bibliography & Image Credits



The Theoretical Minimum: What You Need to Know to Start Doing Physics

Susskind, Leonard, and George Hrabovsky

New York: Basic Books, 2014



Classical Dynamics of Particles and Systems

Bradley W. Carroll and Jerry B. Marion

Addison Wesley Publishing Company



No-Nonsense Classical Mechanics: a Student-Friendly Introduction

Schwichtenberg, Jakob

Karlsruhe, Germany: No-Nonsense Books, 2020



Physics from Symmetry

Schwichtenberg, Jakob

Springer International Publish, 2018