

# Notes on Variational Calculus

Pugazharasu A D

August 1, 2020

**Abstract**

1	Introduction
2	Statement of the Problem
3	The Euler-Lagrangian Equation
4	The "Second Form" of the Euler Equation
5	The " $\delta$ " Notation
6	Special Cases
6.1	$F$ Does Not Contain $y$ Explicitly
6.2	$F$ Does Not Contain $x$ Explicitly
7	Some extensions
7.1	Several Dependent Variables
7.2	Several Independent Variables
7.3	Higher-Order Derivatives
7.4	Variable End-Points
8	Constrained Variation
9	Physical Variational Principles
9.1	Fermat's Principle in Optics
9.2	Hamilton's Principle in Mechanics
10	General Eigenvalue Problem
11	Estimation of Eigenvalues and Eigenfunctions
12	Adjustment of Parameters
	Refernces