

Notes on Variational Calculus

Pugazharasu A D

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Abstract

1 Statement of the Problem

The basic problem of this subject is to determine the function $y(x)$, such that the integral

$$J = \int_{x_1}^{x_2} f\{y(x), y'(x); x\} dx \quad (1)$$

2	The Euler-Lagrangian Equation
3	The "Second Form" of the Euler Equation
4	The " δ " Notation
5	Special Cases
5.1	F Does Not Contain y Explicitly
5.2	F Does Not Contain x Explicitly
6	Some extensions
6.1	Several Dependent Variables
6.2	Several Independent Variables
6.3	Higher-Order Derivatives
6.4	Variable End-Points
7	Constrained Variation
8	Physical Variational Principles
8.1	Fermat's Principle in Optics
8.2	Hamilton's Principle in Mechanics
9	General Eigenvalue Problem
10	Estimation of Eigenvalues and Eigenfunctions
11	Adjustment of Parameters
	References