

Table of Contents

- DEFINITION and CLASSIFICATION
 - Introduction to Partial Differential Equations
 - Types of Partial Differential Equations

- **METHODS OF SOLUTION**

- Separation of Variables
- Method of Characteristics

- DEFINITION and CLASSIFICATION

Partial differential equations (PDEs) are mathematical equations involving multiple independent variables and their partial derivatives. They are classified based on their order (highest derivative present), linearity (based on coefficients), and type (e.g., elliptic, parabolic, hyperbolic). PDEs play a crucial role in physics, engineering, and various fields of mathematics due to their ability to model complex phenomena.

- Introduction to Partial Differential Equations

Partial differential equations (PDEs) involve functions of multiple variables and their partial derivatives. They are used to describe various phenomena in physics, engineering, and other fields. Solutions to PDEs typically depend on boundary conditions and initial conditions.

- Types of Partial Differential Equations

Types of Partial Differential Equations include elliptic PDEs, parabolic PDEs, and hyperbolic PDEs. Elliptic PDEs involve second derivatives and are used in steady-state problems. Parabolic PDEs describe phenomena that evolve over time, while hyperbolic PDEs are used to model wave-like behavior.

Partial differential equations are mathematical expressions used to describe how functions change in multiple variables. They are often used to model physical phenomena in areas such as physics, engineering, and economics. Solving partial differential equations typically involves techniques such as separation of variables, Fourier transforms, and numerical methods.

- METHODS OF SOLUTION

- Separation of Variables

The separation of variables method is a technique used in solving partial differential equations by assuming the solution can be expressed as a product of functions of individual variables. By applying this method, the original partial differential equation is transformed into simpler ordinary differential equations, which can then be solved individually. Separation of variables is commonly used in various fields such as physics, engineering, and mathematics to find solutions to complex differential equations.

- Method of Characteristics

The Method of Characteristics is a technique used to solve first-order linear partial differential equations. It involves transforming the PDE into a system of ordinary differential equations along characteristic curves. By following these characteristics, the solution to the original PDE can be obtained.