Vector Calculus Overview

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Overview

This module introduces the mathematical framework of **vector calculus**, essential for understanding physics in three or more dimensions. It covers fundamental concepts, operations, and applications frequently used across physics courses, especially electromagnetism and mechanics.

Contents

- **Vector Spaces:** Definitions, linear independence, and the structure of spaces where vectors live.
- **Inner Product:** Properties of the dot product, including the Kronecker delta notation.
- **Vector Product:** Cross product, exterior product, and their properties.
- **Triple Products:** Relations involving scalar and vector triple products.
- **Euclidean Space:** Cartesian coordinates and tangent vectors.
- **Differential Calculus:** Gradient, divergence, curl, and higher-order derivatives.
- **Integral Calculus:** Line, surface, and volume integrals.
- **Curvilinear Coordinates:** Basis vectors, differential operators, and orthogonal coordinate systems.
- **Dirac Delta:** Introduction and properties of the delta distribution.
- **Vector Field Decomposition:** Techniques to break down vector fields into simpler components.

This course aims to build a solid foundation for applying these mathematical tools throughout your physics studies.

Feel free to create issues, ask questions, or suggest improvements in the [GitHub repository](#).