2.4 Orthogonal Coordinate Systems (pp.16-33)

1)

2)

Q:

A:

1.

2.

3.

Definition:).

A. Coordinates

*

*

*

Point P(0,0,0) is <u>always</u> the origin.

HO: Cartesian Coordinates

HO: Cylindrical Coordinates

HO: Spherical Coordinates

B. Coordinate Transformations

HO: Coordinate Transformations

Example: Coordinate Transformations

C. Base Vectors

*

*

HO: Base Vectors

HO: Cartesian Base Vectors

D. Vector Expansion using Base Vectors

Q:

A:

e.g.,

$$\mathbf{B} = B_1 \hat{\boldsymbol{a}}_1 + B_2 \hat{\boldsymbol{a}}_2 + B_3 \hat{\boldsymbol{a}}_3$$

or

$$\boldsymbol{C} = C_x \hat{\boldsymbol{a}}_x + C_y \hat{\boldsymbol{a}}_y + C_z \hat{\boldsymbol{a}}_z$$

HO: Vector Expansion using Base Vectors

E. Spherical and Cylindrical Base Vectors

HO: Spherical Base Vectors

HO: Cylindrical Base Vectors

F. Vector Algebra and Vector Expansions

HO: Vector Algebra using Orthonormal Base Vectors

G. The Vector Field

*

*

*

*

This means that the **3** scalar components of vector field are **each** a **scalar field**!

HO: Vector Fields

HO: Expressing Vector Fields with Coordinate Systems

H. The Position Vector

We call this directed distance the position vector.

HO: The Position Vector

HO: Applications of the Position Vector

HO: Vector Field Notation

HO: A Gallery of Vector Fields