

ECE 2300

Recitation Class 1

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Pre-class



- 3 exams (25% each for mid, 30% for final)
- 6 in-class quizzes (20% in total)
- Homework not graded, recommended to finish
- RC class format: slides? Written notes?

1.1 Review on terminologies



- Vector:

- Scalar:

1.1 Review on terminologies



- Del:
- Gradient:

1.1 Review on terminologies



- Divergence:
- Curl:
- https://www.bilibili.com/video/BV19s41157Z4/?spm_id_from=333.999.0.0&vd_source=f0a8eb85590d4c542e941ee727d8d28c

1.2 Vector Manipulation



- Dot Products:

1.2 Vector Manipulation



- Cross Products:

1.2 Vector Manipulation



- Volume:

1.2 Vector Manipulation



- BAC-CAB rule (Vector Triple Product):

1.3 Coordinates



- Basis:

1.3 Coordinates



- Differential length, area, volume:

1.3.1 Cartesian Coordinates



- Figure:
- Right hand rule:

1.3.1 Cartesian Coordinates



- Dot/Cross product:

1.3.1 Cartesian Coordinates



- Differential length:
- Differential area:
- Differential volume:

Ex1. Vector



1.3.2 Cylindrical Coordinates



- Figure:
- Right hand rule:

1.3.2 Cylindrical Coordinates



- Differential length:
- Differential area:
- Differential volume:

1.3.2 Cylindrical Coordinates



- Transformation vector:

1.3.3 Spherical Coordinates



- Figure:
- Right hand rule:

1.3.3 Spherical Coordinates



- Differential length:
- Differential area:
- Differential volume:

1.3.3 Spherical Coordinates



- Transformation vector:

1.4 Integrals



- Line Integral:

1.4 Integrals



- Surface Integral:

1.4 Integrals



- Volume Integral:

1.5 Language used in Maxwell Equations



- Gradient:

1.5 Language used in Maxwell Equations



- Divergence:

1.5 Language used in Maxwell Equations



- Curl:

1.5 Language used in Maxwell Equations



- Curl:

1.6 Useful Vector theorems



- Divergence Theorem:

1.6 Useful Vector theorems



- Stokes' s Theorem:

1.6 Useful Vector theorems



- Null identities:

1.6 Useful Vector theorems



- Helmholtz Theorem (Fundamental theorem of vector calculus):

Ex2. Theorems application



- (HW1-8) Given a vector function $\mathbf{F} = \mathbf{a}_x(x + c_1 z) + \mathbf{a}_y(c_2 x - 3z) + \mathbf{a}_z(x + c_3 y + c_4 z)$.
 - a) Determine the constants c_1 , c_2 , and c_3 if \mathbf{F} is irrotational.
 - b) Determine the constant c_4 if \mathbf{F} is also solenoidal.
 - c) Determine the scalar potential function V whose negative gradient equals \mathbf{F} .

Ex2. Theorems application





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Thank You

Credit to Deng Naihao for this slides & information