SNS COLLEGE OF TECHNOLOGY

(An Autonomous Institution)

COIMBATORE-35

Accredited by NBA-AICTE and Accredited by NAAC – UGC with A+ Grade
Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai

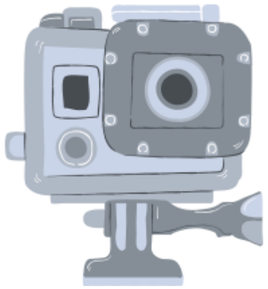
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

COURSE NAME: 19EET201/ FIELD THEORY

II YEAR / III SEMESTER

Unit 1 – INTRODUCTION

Topic : STOKE'S THEOREM



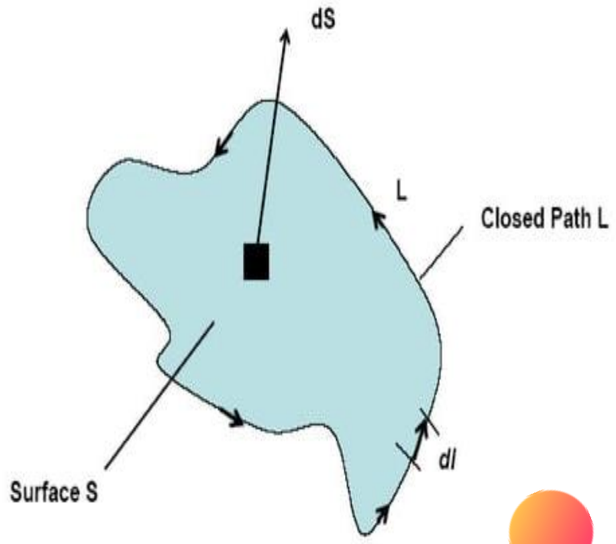
Contents:

- Stoke’s Theorem
- Problems on Stoke’s theorem

STOKE'S THEOREM

The circulation of a vector field **A** around a closed path L is equal to the surface integral of the curl of **A** over the open surface S bounded by L that **A** and curl of **A** are continuous on S.

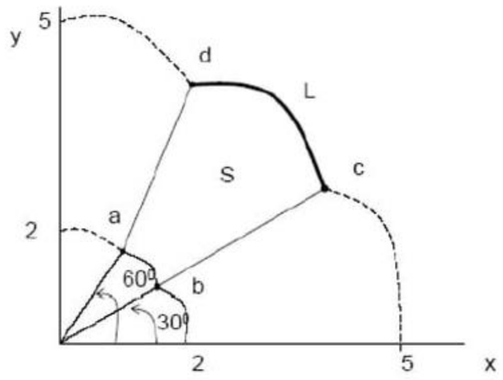
$$\oint_L \mathbf{A} \bullet dl = \int_S (\nabla \times \mathbf{A}) \bullet dS$$



PROBLEM 1…

By using Stoke's Theorem, evaluate $\oint \mathbf{A} \bullet dl$ for

$$\vec{\mathbf{A}} = \rho \cos\phi \mathbf{a}_\rho + \sin\phi \mathbf{a}_\phi$$



SOLUTION...

Stoke's Theorem,

$$\oint_L \mathbf{A} \bullet dl = \int_S (\nabla \times \mathbf{A}) \bullet dS$$

Evaluate right side to get left side,

where, $d\mathbf{S} = \rho d\phi d\rho \mathbf{a}_z$ and

$$\nabla \times \mathbf{A} = \frac{1}{\rho}(1+\rho)\sin\phi \mathbf{a}_z$$

$$\int_S (\nabla \times \mathbf{A}) \bullet dS = \int_{\phi=30^0}^{60^0} \int_{\rho=2}^{5} \frac{1}{\rho}(1+\rho)\sin\phi \rho d\phi d\rho \mathbf{a}_z$$

$$= 4.941$$


Thank
You!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