Math Method II

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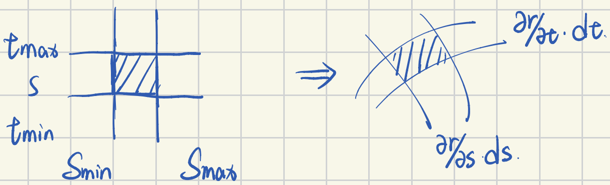
- Surface Integral

$r(s,t)$ Parametrization $\rightarrow \begin{pmatrix} x(s,t) \\ y(s,t) \\ z(s,t) \end{pmatrix}$ with $s \in [s_{min} \sim s_{max}]$, $t \in [t_{min} \sim t_{max}]$

Similar With Scale factor Method



$dA = ds \cdot dt$ $\qquad$ $dA = \left|\partial r/\partial s \times \partial r/\partial t\right| ds\,dt$

$I_1 = \int f(r)\, dA$ $\quad \downarrow \quad$ $I_2 = \int G(r) \cdot dA$ $\rightarrow$ Flux

G(r) represent vector field

- Gauss Divergent Theorm - [Application is in MathMethod - week 1 Laplacien Method]

$$\int \underbrace{G(r)}_{\uparrow\ \text{Surface}}\, ds = \int_V \underbrace{\nabla \cdot (G(r))}_{\uparrow\ \text{Volumn}} \cdot dv \quad \longrightarrow \quad \nabla \cdot E = \rho/\varepsilon_0$$

- Stoke's Theory

$$\oint_{C=\partial S} \underbrace{G(r) \cdot dr}_{\uparrow\ \text{Line Int.}} = \int_S \underbrace{\nabla \times G \cdot ds}_{\uparrow\ \text{Surface integration of } \nabla \times G} \quad \longrightarrow \quad \nabla \times B = \mu_0 I$$