

$$\iint_S \mathbf{B} \cdot d\mathbf{s} \quad \mathbf{B} \in \mathbb{R}^3 \quad (\text{No es un campo!})$$

por ejemplo  $\mathbf{B} = (1, 2, 3)$  ó  $(7, -5, 38\pi)$

$$\mathbf{B} = (a, b, c) \text{ con } a, b, c \in \mathbb{R}$$

$$= \iint_{u,v} \langle (a, b, c), \mathbf{T}_u \times \mathbf{T}_v \rangle du dv$$

Debería componer! ??

Green

$$\int_{\partial D} F \cdot d\mathbf{s} = \iint_D Q_x - P_y$$

$$\oint_{\partial S} \nabla_x F / \nabla_x F(x, y, z) = \mathbf{B} \in \mathbb{R}^3$$

$F \in C^1$  por cte.

$$\iint_{S_1} \mathbf{B} \cdot d\mathbf{s} = \iint_{S_1} \nabla_x F \cdot d\mathbf{s} \stackrel{\downarrow}{=} \iint_{\partial S_1} F \cdot d\mathbf{s}$$

$$\nabla_x F = \begin{vmatrix} i & j & k \\ \partial/\partial x & \partial/\partial y & \partial/\partial z \\ P & Q & R \end{vmatrix}$$

Stokes

$$\int_{\partial S} F \cdot d\mathbf{s} = \iint_S \nabla_x F \cdot d\mathbf{s}$$

$$\langle \nabla_x F(\mathbf{T}(u, v)), \mathbf{T}_u \times \mathbf{T}_v \rangle$$

$$\iint_{S_2} \mathbf{B} \cdot d\mathbf{s} = \iint_{S_2} \nabla_x F \cdot d\mathbf{s} = \iint_{\partial S_2} F \cdot d\mathbf{s}$$

Como

$$\partial S_1 = \partial S_2$$

$$\Rightarrow \iint_{\partial S_1} F \cdot d\mathbf{s} = \iint_{\partial S_2} F \cdot d\mathbf{s} \quad \text{ó} \quad \iint_{\partial S_1} F \cdot d\mathbf{s} = - \iint_{\partial S_2} F \cdot d\mathbf{s}$$

$$\therefore \left( \iint_{\partial S_1} \vec{F} \cdot d\vec{s} \right)^2 = \left( \iint_{\partial S_2} \vec{F} \cdot d\vec{s} \right)^2$$

$$\left( \iint_{S_2} \vec{B} \cdot d\vec{s} \right)^2 = \left( \iint_{S_2} \vec{B} \cdot d\vec{s} \right)^2$$

Find more

$$\left( \iint_{S_2} \vec{B} \cdot d\vec{s} \right)^2 - \left( \iint_{S_2} \vec{B} \cdot d\vec{s} \right)^2 = 0$$

$$\begin{vmatrix} i & j & k \\ \frac{\partial}{\partial x} & \frac{\partial}{\partial y} & \frac{\partial}{\partial z} \\ P & Q & R \end{vmatrix}$$

$$= \left( \underbrace{R_y - Q_z}_a, \underbrace{P_z - R_x}_b, \underbrace{Q_x - P_y}_c \right)$$

$$Q_z = 0$$

$$R_x = 0$$

$$P_y = 0$$

$$= (R_y, P_z, Q_x)$$

$$\left. \begin{array}{l} R_y = a \Rightarrow R = a \cdot y \\ P_z = b \Rightarrow P = b \cdot z \\ Q_x = c \Rightarrow Q = c \cdot x \end{array} \right\} \vec{F} = (b \cdot z, c \cdot x, a \cdot y)$$

$$\text{Obtune } F / \nabla_x F = (a, b, c) = B \quad \forall (a, b, c) \in \mathbb{R}^3$$