

Gradiente, Divergencia, Rotacional, Laplaciano

Coordenadas Cartesianas (x, y, z)

$$f = f(x, y, z) \quad ; \quad \vec{G} = G_x \hat{i} + G_y \hat{j} + G_z \hat{k}$$

$$\vec{\nabla} f = \frac{\partial f}{\partial x} \hat{i} + \frac{\partial f}{\partial y} \hat{j} + \frac{\partial f}{\partial z} \hat{k}$$

$$\vec{\nabla} \cdot \vec{G} = \frac{\partial G_x}{\partial x} + \frac{\partial G_y}{\partial y} + \frac{\partial G_z}{\partial z}$$

$$\vec{\nabla} \times \vec{G} = \left(\frac{\partial G_z}{\partial y} - \frac{\partial G_y}{\partial z} \right) \hat{i} + \left(\frac{\partial G_x}{\partial z} - \frac{\partial G_z}{\partial x} \right) \hat{j} + \left(\frac{\partial G_y}{\partial x} - \frac{\partial G_x}{\partial y} \right) \hat{k}$$

$$\nabla^2 f = \frac{\partial^2 f}{\partial x^2} + \frac{\partial^2 f}{\partial y^2} + \frac{\partial^2 f}{\partial z^2}$$

Coordenadas Cilíndricas (ρ, ϕ, z)

$$f = f(\rho, \phi, z) \quad ; \quad \vec{G} = G_\rho \hat{\rho} + G_\phi \hat{\phi} + G_z \hat{z}$$

$$\vec{\nabla} f = \frac{\partial f}{\partial \rho} \hat{\rho} + \frac{1}{\rho} \frac{\partial f}{\partial \phi} \hat{\phi} + \frac{\partial f}{\partial z} \hat{z}$$

$$\vec{\nabla} \cdot \vec{G} = \frac{1}{\rho} \frac{\partial}{\partial \rho} (\rho G_\rho) + \frac{1}{\rho} \frac{\partial G_\phi}{\partial \phi} + \frac{\partial G_z}{\partial z}$$

$$\vec{\nabla} \times \vec{G} = \left(\frac{1}{\rho} \frac{\partial G_z}{\partial \phi} - \frac{\partial G_\phi}{\partial z} \right) \hat{\rho} + \left(\frac{\partial G_\rho}{\partial z} - \frac{\partial G_z}{\partial \rho} \right) \hat{\phi} + \left(\frac{\partial G_\phi}{\partial \rho} - \frac{\partial G_\rho}{\partial \phi} \right) \hat{z}$$

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Cartagena99

Coordenadas Esféricas (r, θ, ϕ)

$$f = f(r, \theta, \phi) \quad ; \quad \vec{G} = G_r \hat{r} + G_\theta \hat{\theta} + G_\phi \hat{\phi}$$

$$\vec{\nabla} f = \frac{\partial f}{\partial r} \hat{r} + \frac{1}{r} \frac{\partial f}{\partial \theta} \hat{\theta} + \frac{1}{r \operatorname{sen} \theta} \frac{\partial f}{\partial \phi} \hat{\phi}$$

$$\vec{\nabla} \cdot \vec{G} = \frac{1}{r^2} \frac{\partial}{\partial r} (r^2 G_r) + \frac{1}{r \operatorname{sen} \theta} \frac{\partial}{\partial \theta} (\operatorname{sen} \theta G_\theta) + \frac{1}{r \operatorname{sen} \theta} \frac{\partial G_\phi}{\partial \phi}$$

$$\begin{aligned} \vec{\nabla} \times \vec{G} &= \frac{1}{r \operatorname{sen} \theta} \left[\frac{\partial}{\partial \theta} (\operatorname{sen} \theta G_\phi) - \frac{\partial G_\theta}{\partial \phi} \right] \hat{r} \\ &+ \left[\frac{1}{r \operatorname{sen} \theta} \frac{\partial G_r}{\partial \phi} - \frac{1}{r} \frac{\partial}{\partial r} (r G_\phi) \right] \hat{\theta} + \frac{1}{r} \left[\frac{\partial}{\partial r} (r G_\theta) - \frac{\partial G_r}{\partial \theta} \right] \hat{\phi} \end{aligned}$$

$$\nabla^2 f = \frac{1}{r^2} \frac{\partial}{\partial r} \left(r^2 \frac{\partial f}{\partial r} \right) + \frac{1}{r^2 \operatorname{sen} \theta} \frac{\partial}{\partial \theta} \left(\operatorname{sen} \theta \frac{\partial f}{\partial \theta} \right) + \frac{1}{r^2 \operatorname{sen}^2 \theta} \frac{\partial^2 f}{\partial \phi^2}$$

The logo for Cartagena99 features the text 'Cartagena99' in a stylized, teal-colored font. The '99' is significantly larger and more prominent than the 'Cartagena' part. The text is set against a background of overlapping light blue and orange geometric shapes, possibly representing a globe or abstract design.

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