RÉVISIONS PHYSIQUE

Analyse vectorielle

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Physique Analyse vectorielle

$$\vec{\nabla} = \begin{pmatrix} \partial/\partial x \\ \partial/\partial y \\ \partial/\partial z \end{pmatrix} = \begin{pmatrix} \partial/\partial r \\ (1/r)\cdot\partial/\partial\theta \\ \partial/\partial z \end{pmatrix} = \begin{pmatrix} \partial/\partial r \\ (1/r)\,\partial/\partial\theta \\ (1/r\sin\theta)\,\partial/\partial\varphi \end{pmatrix}$$

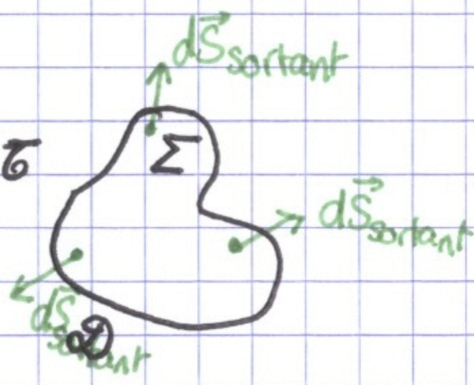
Carthésien — Cylindrique — Sphérique

- **gradient** : $\overrightarrow{grad}\, f = \vec{\nabla} f$
- **divergence** : $div \vec{F} = \vec{\nabla}\cdot \vec{F}$
- **rotationnel** : $\overrightarrow{rot}\, \vec{F} = \vec{\nabla} \wedge \vec{F}$
- **laplacien** : $\Delta f = \vec{\nabla}^2 f = \vec{\nabla}\cdot(\vec{\nabla} f)$

Laplacien vectoriel : $\vec{\Delta}\vec{F} = \overrightarrow{grad}(div \vec{F}) - \overrightarrow{rot}(\overrightarrow{rot}\,\vec{F})$

Théorème de Green - Ostrogradski

$$\oiint_{\Sigma} \vec{F}\cdot d\vec{S}_{sortant} = \iiint_{\mathcal{D}} div\, \vec{F}\cdot d\tau$$



Théorème de Stokes - Ampère

$$\oint_{\Gamma} \vec{F}\cdot d\vec{\ell} = \iint_{\Sigma} \overrightarrow{rot}\, \vec{F}\cdot \underbrace{d\vec{S}}_{\text{règle de la main droite}}$$