Formulaire d'analyse vectorielle

Coordonnées	$\overrightarrow{u}_1$	$\overrightarrow{u}_2$	$\overrightarrow{u}_3$	s_1	s_2	s_3	μ_1	μ_2	μ_3
cartésiennes	$\overrightarrow{u}_x$	$\overrightarrow{u}_y$	$\overrightarrow{u}_z$	x	y	z	1	1	1
cylindriques	$\overrightarrow{u}_r$	$\overrightarrow{u}_\theta$	$\overrightarrow{u}_z$	r	θ	z	1	r	1
sphériques	$\overrightarrow{u}_r$	$\overrightarrow{u}_\theta$	$\overrightarrow{u}_\varphi$	r	θ	φ	1	r	$r.\sin\theta$

$$\overrightarrow{grad}(f) = \begin{pmatrix} \frac{1}{\mu_1}.\frac{\partial f}{\partial s_1} \\ \frac{1}{\mu_2}.\frac{\partial f}{\partial s_2} \\ \frac{1}{\mu_3}.\frac{\partial f}{\partial s_3} \end{pmatrix}$$

$$\overrightarrow{rot}\left(\overrightarrow{A}\right) = \begin{pmatrix} \frac{1}{\mu_2.\mu_3}\left[\frac{\partial(\mu_3.A_3)}{\partial s_2} - \frac{\partial(\mu_2.A_2)}{\partial s_3}\right] \\ \frac{1}{\mu_3.\mu_1}\left[\frac{\partial(\mu_1.A_1)}{\partial s_3} - \frac{\partial(\mu_3.A_3)}{\partial s_1}\right] \\ \frac{1}{\mu_1.\mu_2}\left[\frac{\partial(\mu_2.A_2)}{\partial s_1} - \frac{\partial(\mu_1.A_1)}{\partial s_2}\right] \end{pmatrix}$$

$$div\left(\overrightarrow{A}\right) = \frac{1}{\mu_1.\mu_2.\mu_3}\left(\frac{\partial(\mu_2.\mu_3.A_1)}{\partial s_1} + \frac{\partial(\mu_3.\mu_1.A_2)}{\partial s_2} + \frac{\partial(\mu_1.\mu_2.A_3)}{\partial s_3}\right)$$

$$\Delta f = \frac{1}{\mu_1.\mu_2.\mu_3}\left[\frac{\partial}{\partial s_1}\left(\frac{\mu_2.\mu_3}{\mu_1}.\frac{\partial f}{\partial s_1}\right) + \frac{\partial}{\partial s_2}\left(\frac{\mu_3.\mu_1}{\mu_2}.\frac{\partial f}{\partial s_2}\right) + \frac{\partial}{\partial s_3}\left(\frac{\mu_1.\mu_2}{\mu_3}.\frac{\partial f}{\partial s_3}\right)\right]$$

$$\Delta\overrightarrow{A} = \begin{pmatrix} \Delta A_x \\ \Delta A_y \\ \Delta A_z \end{pmatrix}$$

$$\overrightarrow{\nabla}(U+V) = \overrightarrow{\nabla}U + \overrightarrow{\nabla}V$$

$$\overrightarrow{\nabla}\left(\overrightarrow{A}+\overrightarrow{B}\right) = \overrightarrow{\nabla}\overrightarrow{A} + \overrightarrow{\nabla}\overrightarrow{B}$$

$$\overrightarrow{\nabla}\wedge\left(\overrightarrow{A}+\overrightarrow{B}\right) = \overrightarrow{\nabla}\wedge\overrightarrow{A} + \overrightarrow{\nabla}\wedge\overrightarrow{B}$$

$$\overrightarrow{\nabla}\wedge\left(\overrightarrow{\nabla}U\right) = \overrightarrow{0}$$

$$\overrightarrow{\nabla}.\left(\overrightarrow{\nabla}\wedge\overrightarrow{A}\right) = 0$$

$$\overrightarrow{\nabla}.\left(\overrightarrow{\nabla}U\right) = \nabla^2 U$$

$$\overrightarrow{\nabla}\wedge\left(\overrightarrow{\nabla}\wedge\overrightarrow{A}\right) = \overrightarrow{\nabla}.\left(\overrightarrow{\nabla}.\overrightarrow{A}\right) - \nabla^2.\overrightarrow{A}$$

$$\overrightarrow{\nabla}(U.V) = \left(\overrightarrow{\nabla}U\right).V + U.\left(\overrightarrow{\nabla}V\right)$$

$$\overrightarrow{\nabla}\left(U.\overrightarrow{A}\right) = \left(\overrightarrow{\nabla}U\right).\overrightarrow{A} + U.\left(\overrightarrow{\nabla}\overrightarrow{A}\right)$$

$$\overrightarrow{\nabla}\wedge\left(U.\overrightarrow{A}\right) = \left(\overrightarrow{\nabla}U\right)\wedge\overrightarrow{A} + U.\left(\overrightarrow{\nabla}\wedge\overrightarrow{A}\right)$$

$$\overrightarrow{\nabla}.\left(\overrightarrow{A}\wedge\overrightarrow{B}\right) = \left(\overrightarrow{\nabla}\wedge\overrightarrow{A}\right).\overrightarrow{B} - \overrightarrow{A}.\left(\overrightarrow{\nabla}\wedge\overrightarrow{B}\right)$$

$$\overrightarrow{\nabla}\wedge\left(\overrightarrow{A}\wedge\overrightarrow{B}\right) = \left(\overrightarrow{\nabla}.\overrightarrow{B}\right).\overrightarrow{A} - \left(\overrightarrow{\nabla}.\overrightarrow{A}\right).\overrightarrow{B} + \left(\overrightarrow{B}.\overrightarrow{\nabla}\right).\overrightarrow{A} - \left(\overrightarrow{A}.\overrightarrow{\nabla}\right).\overrightarrow{B}$$

$$\overrightarrow{\nabla}.\left(\overrightarrow{A}.\overrightarrow{B}\right) = \overrightarrow{A}\wedge\left(\overrightarrow{\nabla}\wedge\overrightarrow{B}\right) + \overrightarrow{B}\wedge\left(\overrightarrow{\nabla}\wedge\overrightarrow{A}\right) + \left(\overrightarrow{A}.\overrightarrow{\nabla}\right).\overrightarrow{B} + \left(\overrightarrow{B}.\overrightarrow{\nabla}\right).\overrightarrow{A}$$

$$\oint f.\overrightarrow{dl} = \iint \overrightarrow{d^2S}\wedge\overrightarrow{grad}(f) \quad \text{et} \quad \oint \overrightarrow{A}.\overrightarrow{dl} = \iint \overrightarrow{rot}\left(\overrightarrow{A}\right).\overrightarrow{d^2S}$$

$$\oiint f.\overrightarrow{d^2S} = \iiint \overrightarrow{grad}(f).d^3\tau \quad \text{et} \quad \oiint \overrightarrow{A}.\overrightarrow{d^2S} = \iiint div\left(\overrightarrow{A}\right).d^3\tau$$

$$\oiint \overrightarrow{d^2S}\wedge\overrightarrow{A} = \iiint \overrightarrow{rot}\left(\overrightarrow{A}\right).d^3\tau$$