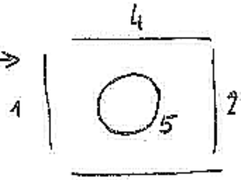
Formulations faibles - Dernière Version →



•) Densité

I) $-i\omega\rho_0\vec{v} = -\vec{\nabla}p + \eta\nabla^2\vec{v} + (\xi + \frac{1}{3}\eta)\vec{\nabla}(\vec{\nabla}\cdot\vec{v}) + \underbrace{f_0\, e^{ikx}\,\hat{x}}_{\vec{f}}$

$\vec{v} = \tilde{\vec{v}}\, e^{ikx}$

$$\begin{cases} \vec{f} = f_0\,\hat{x}\,e^{ikx} \\ \Phi = \phi_0\, e^{ikx} \\ \vec{f} = -\vec{\nabla}\phi \quad \Rightarrow f_0 = -ik\Phi_0 \end{cases}$$

$p = \tilde{p}\, e^{ikx}$

Formulation faible

1) $\vec{\nabla}p = (\vec{\nabla}\tilde{p})\, e^{ikx} + (\vec{\nabla}e^{ikx})\, p$

$\Rightarrow \boxed{\vec{\nabla}p = (\vec{\nabla}\tilde{p})\, e^{ikx} + (ik\tilde{p})\, e^{ikx}\,\hat{x}}$

2) $\nabla^2\vec{v} = \nabla^2 v_x\,\hat{x} + \nabla^2 v_y\,\hat{y}$

•) $\nabla^2 v_x = \nabla^2(\tilde{v}_x\, e^{ikx}) = \vec{\nabla}\cdot\vec{\nabla}(\tilde{v}_x\, e^{ikx})$

$= \vec{\nabla}\cdot\left[(\vec{\nabla}\tilde{v}_x)\, e^{ikx} + \tilde{v}_x(\vec{\nabla}e^{ikx})\right]$

$= \vec{\nabla}\cdot\left[(\vec{\nabla}\tilde{v}_x)\, e^{ikx} + ik\,\tilde{v}_x\, e^{ikx}\,\hat{x}\right]$

$= (\nabla^2\tilde{v}_x)\, e^{ikx} + (\vec{\nabla}\tilde{v}_x)\cdot ik\, e^{ikx}\,\hat{x} + ik\,\vec{\nabla}\cdot(\tilde{v}_x\hat{x})\, e^{ikx}$

$+ (ik)\,\tilde{v}_x\,\hat{x}\cdot\vec{\nabla}(e^{ikx})$

$= (\nabla^2\tilde{v}_x)\, e^{ikx} + ik(\partial_x\tilde{v}_x)\, e^{ikx} + ik(\partial_x\tilde{v}_x)\, e^{ikx} - k^2 v_x\, e^{ikx}$

$\Rightarrow \boxed{\nabla^2 v_x = (\nabla^2\tilde{v}_x)\, e^{ikx} + 2ik(\partial_x\tilde{v}_x)\, e^{ikx} - k^2 v_x\, e^{ikx}}$

$\Rightarrow \boxed{\nabla^2 v_y = (\nabla^2\tilde{v}_y)\, e^{ikx} + 2ik(\partial_x\tilde{v}_y)\, e^{ikx} - k^2 v_y\, e^{ikx}}$