

④ $\vec{V} = \hat{x} u(x,y) - \hat{y} v(x,y)$

incomp. : $\nabla \cdot \vec{V} = 0$:

$$\frac{\partial u}{\partial x} - \frac{\partial v}{\partial y} = 0 \quad \checkmark$$

rotational: $\nabla \times \vec{V} = 0 =$

\hat{x}	\hat{y}	\hat{z}	
$\frac{\partial}{\partial x}$	$\frac{\partial}{\partial y}$	$\frac{\partial}{\partial z}$	$=$
u	$-v$		

$$= \hat{y} \frac{\partial u}{\partial z} - \hat{x} \frac{\partial v}{\partial z} - \hat{z} \frac{\partial u}{\partial y} + \hat{z} \frac{\partial v}{\partial x} = 0$$

$$-\frac{\partial v}{\partial x} - \frac{\partial u}{\partial y} = 0$$

or

$$\frac{\partial u}{\partial y} = -\frac{\partial v}{\partial x} \quad \checkmark$$

QED