Resumen de ecuaciones Guía 6 - Ejercicios 1, 2 y 3

Coordenadas	**Campo Velocidad**		**Vorticidad** $(\Omega_{ij} = -\Omega_{ji})$	**Tasa de deformación** $(V_{ij} = V_{ji})$	**Gráficos**	**Divergencia** $\nabla \cdot \boldsymbol{v}$
	Func. Potencial	**Func. de Corriente**				
Cartesianas $\Phi(x, y)$ $u(x, y)$; $v(x, y)$	$u = \frac{\partial \Phi}{\partial x}$ $v = \frac{\partial \Phi}{\partial y}$	$u = \frac{\partial \Psi}{\partial y}$ $v = -\frac{\partial \Psi}{\partial x}$	$\Omega_{ij} = \frac{1}{2}\left(\frac{\partial v_j}{\partial x_i} - \frac{\partial v_i}{\partial x_j}\right)$ 2D: $\Omega_{12} = \frac{1}{2}\left(\frac{\partial v}{\partial x} - \frac{\partial u}{\partial y}\right)$	$V_{ij} = \frac{1}{2}\left(\frac{\partial v_j}{\partial x_i} + \frac{\partial v_i}{\partial x_j}\right)$ 2D: $V_{11} = \frac{\partial u}{\partial x}$; $V_{22} = \frac{\partial v}{\partial y}$; $V_{12} = \frac{1}{2}\left(\frac{\partial v}{\partial x} + \frac{\partial u}{\partial y}\right)$	Func. Potencial, Func. de Corriente y Vect. Velocidad	$\nabla \cdot \boldsymbol{v} = \frac{\partial v_i}{\partial x_i}$
Cilíndricas $\Phi(r, \theta)$ $u_r(r, \theta)$; $u_\theta(r, \theta)$	$u_r = \frac{\partial \Phi}{\partial r}$ $u_\theta = \frac{1}{r}\frac{\partial \Phi}{\partial \theta}$	$u_r = \frac{1}{r}\frac{\partial \Psi}{\partial \theta}$ $u_\theta = -\frac{\partial \Psi}{\partial r}$	2D: $\Omega_{r\theta} = \frac{1}{2}\left(\frac{\partial u_\theta}{\partial r} - \frac{1}{r}\frac{\partial u_r}{\partial \theta} + \frac{u_\theta}{r}\right)$	2D: $V_{rr} = \frac{\partial u_r}{\partial r}$; $V_{\theta\theta} = \frac{u_r}{r} + \frac{1}{r}\frac{\partial u_\theta}{\partial \theta}$; $V_{r\theta} = \frac{1}{2}\left(\frac{\partial u_\theta}{\partial r} + \frac{1}{r}\frac{\partial u_r}{\partial \theta} - \frac{u_\theta}{r}\right)$	Idem. Rotar u_r y u_θ a u y v. $u = u_r \cos\theta - u_\theta \sin\theta$ $v = u_r \sin\theta + u_\theta \cos\theta$	2D: $\nabla \cdot \boldsymbol{v} =$ $\frac{\partial u_r}{\partial r} + \frac{1}{r}\frac{\partial u_\theta}{\partial \theta} + \frac{u_r}{r}$

	Vorticidad		**Divergencia** $\nabla \cdot \boldsymbol{v}$	
	Coordenadas Cartesianas	**Coordenadas Cilíndricas**	**Coordenadas Cartesianas**	**Coordenadas Cilíndricas**
Función Potencial	2D: $\Omega_{12} = \frac{1}{2}\left(\frac{\partial^2 \Phi}{\partial x \partial y} - \frac{\partial^2 \Phi}{\partial y \partial x}\right) = 0$	2D $\Omega_{r\theta} = \frac{1}{2}\left(-\frac{1}{r^2}\frac{\partial \Phi}{\partial \theta} + \frac{1}{r}\frac{\partial^2 \Phi}{\partial r \partial \theta} - \frac{1}{r}\frac{\partial^2 \Phi}{\partial r \partial \theta} + \frac{1}{r^2}\frac{\partial \Phi}{\partial \theta}\right) = 0$	2D: $\nabla \cdot \boldsymbol{v} = \frac{1}{2}\left(\frac{\partial^2 \Phi}{\partial x^2} + \frac{\partial^2 \Phi}{\partial y^2}\right)$	2D: $\nabla \cdot \boldsymbol{v} = \frac{\partial^2 \Phi}{\partial r^2} + \frac{1}{r^2}\frac{\partial^2 \Phi}{\partial \theta^2} + \frac{1}{r}\frac{\partial \Phi}{\partial r}$
Función Corriente	2D: $\Omega_{12} = -\frac{1}{2}\left(\frac{\partial^2 \Psi}{\partial x^2} + \frac{\partial^2 \Psi}{\partial y^2}\right)$	2D: $\Omega_{r\theta} = -\frac{1}{2}\left(\frac{\partial^2 \Psi}{\partial r^2} + \frac{1}{r^2}\frac{\partial^2 \Psi}{\partial \theta^2} + \frac{1}{r}\frac{\partial \Psi}{\partial r}\right)$	2D: $\nabla \cdot \boldsymbol{v} = \frac{1}{2}\left(\frac{\partial^2 \Psi}{\partial x \partial y} - \frac{\partial^2 \Psi}{\partial y \partial x}\right) = 0$	2D: $\nabla \cdot \boldsymbol{v} = \frac{1}{r}\frac{\partial \Psi}{\partial r \partial \theta} - \frac{1}{r}\frac{\partial \Psi}{\partial \theta \partial r} = 0$