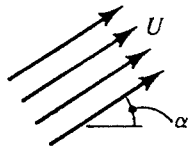
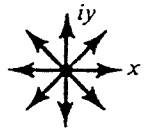
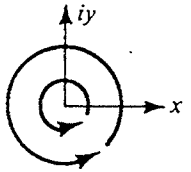
Table 12.1 *Table of Expressions for Elementary Flows* (Fluid Mechanics, R.A. Granger, Dover Publ. N.Y.)

Elementary Flow	Ω Complex Potential ($z_o = 0$)	$\phi(x, y)$	$\phi(r, \theta)$	$\psi(x, y)$	$\psi(r, \theta)$	Streamlines
1. Uniform flow	$Uze^{-i\alpha}$	$U(x \cos \alpha + y \sin \alpha)$	$Ur \cos(\theta - \alpha)$	$U(y \cos \alpha - x \sin \alpha)$	$Ur \sin(\theta - \alpha)$	
2. Source	$\frac{q}{2\pi} \ln z$	$\frac{q}{4\pi} \ln(x^2 + y^2)$	$\frac{q}{2\pi} \ln r$	$\frac{q}{2\pi} \tan^{-1}\left(\frac{y}{x}\right)$	$\frac{q}{2\pi} \theta$	
3. Vortex	$\frac{-i\Gamma_z}{2\pi} \ln z$	$\frac{\Gamma_z}{2\pi} \tan^{-1}\left(\frac{y}{x}\right)$	$\frac{\Gamma_z}{2\pi} \theta$	$-\frac{\Gamma_z}{4\pi} \ln(x^2 + y^2)$	$-\frac{\Gamma_z}{2\pi} \ln r$	
4. Doublet	$\frac{qae^{i\alpha}}{\pi z}$	$\frac{qax \cos \alpha}{\pi(x^2 + y^2)}$	$\frac{qa \cos(\alpha - \theta)}{\pi r}$	$-\frac{qay \sin \alpha}{\pi(x^2 + y^2)}$	$\frac{qa \sin(\alpha - \theta)}{\pi r}$