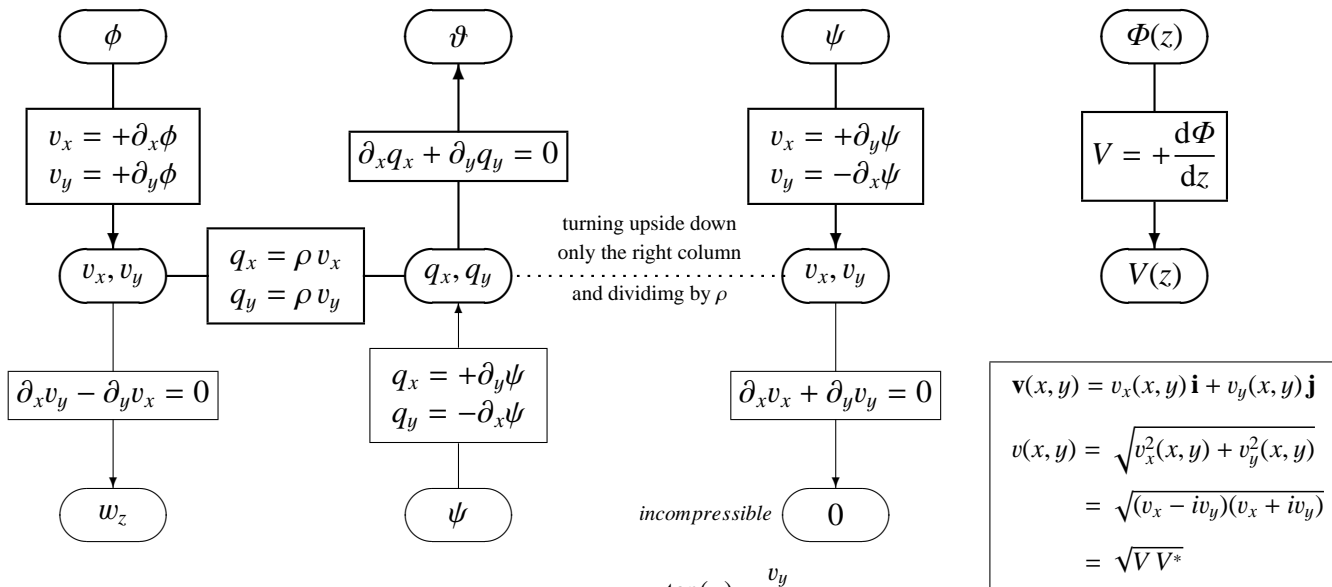


## Plane motion of a fluid using complex variables

use of complex variables for irrotational and incompressible plane fluid flow



$\phi(x, y)$  velocity potential  
 $v_x(x, y), v_y(x, y)$  velocity components  
 $w_z(x, y)$  z-component of vorticity  
 $\psi(x, y)$  stream function  
 $q_x(x, y), q_y(x, y)$  mass current density components  
 $\vartheta(x, y)$  bulk dilatation rate

$$\tan(\alpha) = \frac{v_y}{v_x}$$

complex variable  $z = x + iy$   
 complex potential  $\Phi(z) = \phi(x, y) + i\psi(x, y)$   
 complex velocity  $V(z) = v_x(x, y) - i v_y(x, y) = v \exp(-i\alpha)$

*This diagram is similar to the one of Table ELd8  
 with some differences of sign*