Incompressible Flow

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- Vorticity is seen as more universal, as its a vector, singular, rather than 3D flow field
- $\gamma = c_p/c_v$ ... approximately 1.4 for diatomic gases
  - $P/P_\infty = \left(1 + \frac{\gamma-1}{2} M^2\right)^{\frac{\gamma}{\gamma-1}}$ ... so $\Delta P/P$ must be less than 5%, thumb rule
  - $M = 0.02$ for water. Less than 100 m/s for most
- Continuity Equation ... $\left(\frac{\partial}{\partial t} + \underline{V}\cdot\nabla\right)(\rho) = -\rho \nabla \cdot \underline{V}$, need to fix $\underline{B}$ vs $\underline{b}$

  $\left(\frac{\partial}{\partial t} + \nabla\cdot\right)(\rho V)$ ... ugh wrong? by memory
- Surface Waves ... Non-dispersive waves
  - txtbk, chapter 5 in Lighthill → find dispersion relationship
  - Dispersive ... Fourier Components travel at different velocities

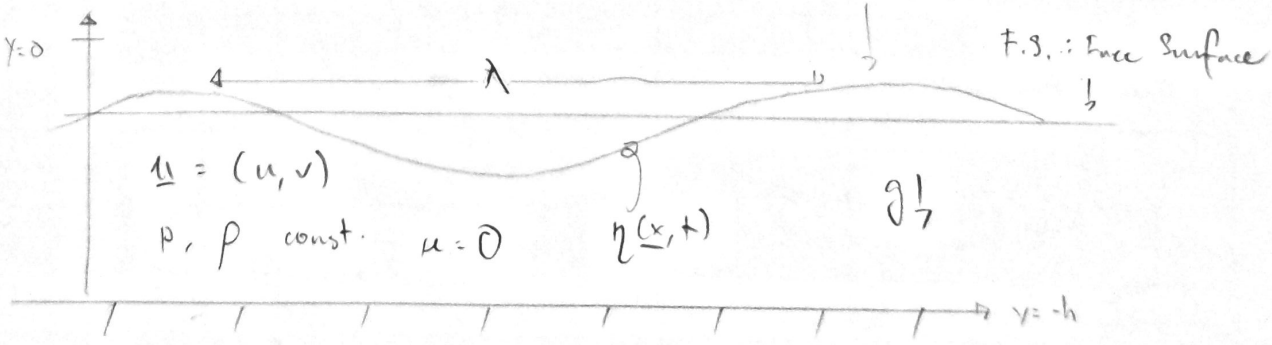
$\zeta(\underline{x}, t) = A_{k,\omega}\, e^{i(\underline{k}\cdot\underline{x} - \omega t)}$

$\underline{k}\cdot\underline{x} = kx\cos\phi + k_y \sin\phi$

a = speed of sound & neq.

- 1D ... $\underline{k}\cdot d\underline{x} - \omega\, dt \to k\,dx - \omega\, dt = 0 \to \frac{dx}{dt} = \frac{\omega}{k} = c$ ... phase speed
- Linear Dispersive Waves
  - Small Amplitude, 2D flow

Small Amplitude → Not Pointy Crest



η ... wave free surface height, inviscid