RG Deep water waves encountering a front 8/19/2019

$\Delta\omega = -kU$

$$c = \frac{g}{\omega}, \quad c = \frac{\omega}{k} = \sqrt{\frac{g}{k}} \Rightarrow \frac{g}{\omega} = \sqrt{\frac{g}{k}} = \frac{\omega}{k}$$

after 1 page of algebra

$$c = \left(\frac{1}{2} + \sqrt{1/4 + U/c_0}\right) c_0$$

for $U = \frac{-1}{4} c_0$

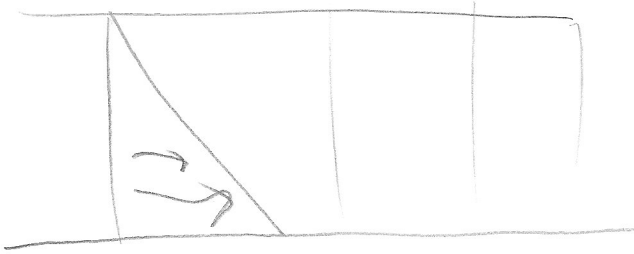
$$c = \frac{1}{2} c_0, \quad U + c = \frac{1}{4} c_0$$

and $c_g = \frac{1}{4} c_0 \Rightarrow U + c_g = 0$!!!

$\boxed{\text{The Simpson Number}}$

$$\frac{AU}{H^2} = \frac{C_D U^2}{H}$$

$$A \sim C_D U H \sim 10^{-3} \cdot 10 = 100 \text{ cm}^2/\text{s}$$



$$\frac{\partial u}{\partial t} + \underline{u} \cdot \nabla u + g \eta_x + \underbrace{\tfrac{1}{2} \beta g \bar{S}_x H}_{①} = \underbrace{-\frac{C_D |u| u}{H}}_{②}$$

$$\boxed{S_i \simeq \frac{①}{②} \simeq \frac{\beta g \bar{S}_x H^2}{C_d U^2}}$$

- Could also get it from the straining equation
- Or as a nondimensional representation of $\frac{U_E}{U_T} \sim 0.1 S_i$

$S_i > 1 \Rightarrow$ friction not enough to keep stratification in check

"runaway stratification"