Lecture Summary For Friday May 1st

We looked at the shallow water system again with Beta turned off, and we introduced a wall into the system. We also assumed that u'= 0 everywhere in the system and for t = any number. As a result, our shallow water equations are reduced to: $f_0 \acute{v} = -g\frac{d\acute{h}}{dx}$, $\frac{d\acute{v}}{dt} = -g\frac{d\acute{h}}{dy}$, and $\frac{d\acute{h}}{dt} + H\frac{d\acute{v}}{dy} = 0.$ Since u' = 0, we see that the wave has to propagate in the y-direction. If we take the partial with respect to "t" of the third shallow water equation we are left with $\frac{d^2\acute{h}}{dt} + H\frac{d}{dy}\left(\frac{d\acute{v}}{dt}\right) = 0.$ Then we took the partial with respect to "y" of the second equation in order to make a substitution. We are left with the differential equation: $\frac{d^2\acute{h}}{dt^2} = gH\frac{d^2\acute{h}}{dy^2}$. From this equation we are able to get the expression $gH = C_{sw}^2$ where C is the shallow water propagation of the wave. Also from this differential equation we get the solutions $\acute{h} = f(y + C_{sw}t)$ for southward propagation and $\acute{h} = f(y - C_{sw}t)$.

Then we plugged $\acute{h} = \hat{h}$(y)exp(i(ly-wt)) into our differential equation which we then simplified to $\frac{w^2}{l^2} = gH$. From this relationship, we were able to make the equality $C_y = {}^{+}/{-}\ \sqrt{gH}$