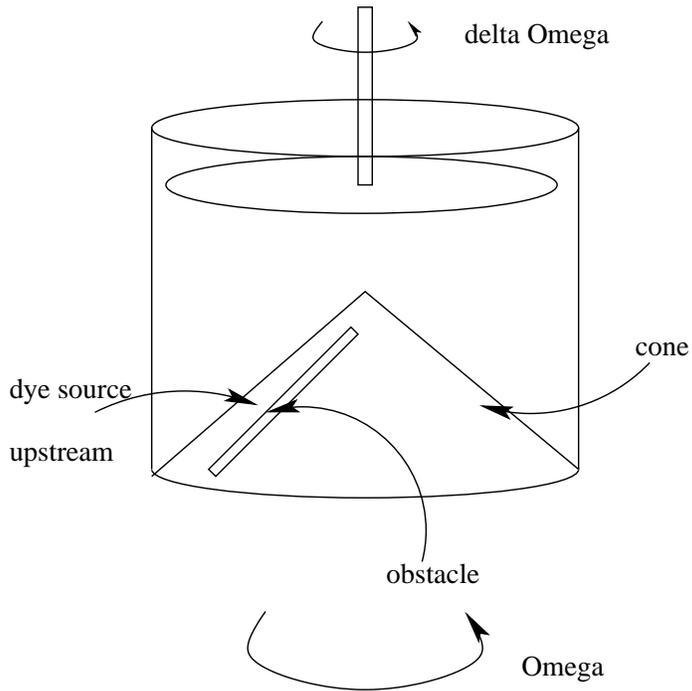


12.804 — Rossby Waves — Tank Experiment

Setup

You can produce a “beta-plane” in the tank with a setup like that shown.



Show that in the Cartesian version, that the effective β is $f \times slope/H$ so that

$$\frac{\partial}{\partial t} \nabla^2 \psi + J(\psi, \nabla^2 \psi) + \frac{f \times slope}{H} \psi_x = -r \nabla^2 \psi$$

is the relevant equation.

If you put an obstacle on the cone, and then rotate the upper lid at angular frequency $\delta f/2$ relative to the tank, you can produce a zonal flow across the obstacle.

To do:

Figure out the wavelength of the waves and pick a suitable f and δf . Look also at cases with δf negative.

What about nonlinearity? Can you keep it small?

Carry out the experiment(s).