

**651-2124-00:**

**Atmospheric General Circulation Dynamics (HW 4, due May 2):**

Consider a rotating shallow-water layer with a free surface over a flat bottom boundary.

1. *Inertia-gravity waves.* Assume uniform rotation with a constant Coriolis parameter  $f = f_0$ .
  - (a) Linearize the shallow-water equations about a state of rest and find the dispersion relation of the waves.
  - (b) Sketch the trajectories of particle motion in the waves.
2. *Rossby waves.* Make the quasigeostrophic (QG) approximation with Coriolis parameter  $f = f_0 + \beta y$ .
  - (a) Linearize the QG potential vorticity equation about a uniform zonal flow and find the dispersion relation of the waves.
  - (b) Discuss the qualitatively different mechanisms of wave propagation for waves that are longer and/or shorter than the Rossby deformation radius  $\lambda = \sqrt{gH_0}/f_0$ .