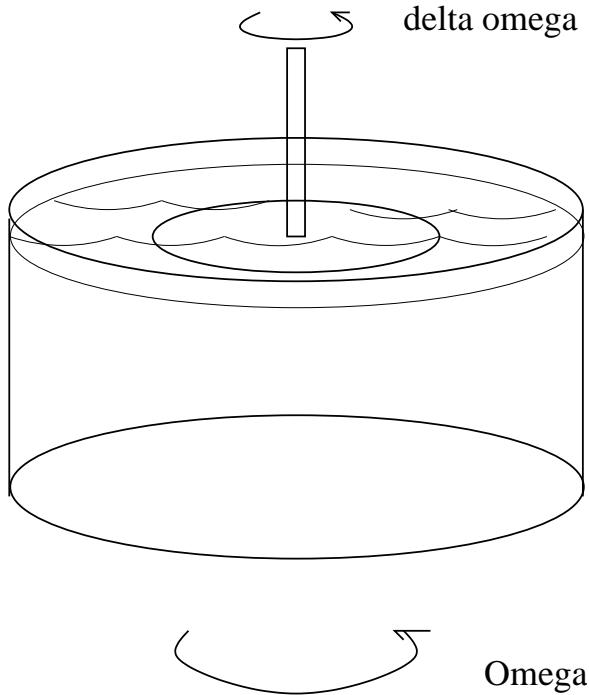# 12.804 — Frontal waves — tank experiment

In the rotating tank, we will attempt to observe frontal waves by generating a shear layer. We immerse a disk slightly below the water surface and then rotate it at a speed $\delta\Omega$ relative to the tank.



You might expect the fluid under the disk to be in solidy body rotation with a rotation rate $\delta\Omega/2$ or vorticity $\delta\Omega$ and the fluid outside to have zero vorticity (relative to the tank, of course). Find the solution with continuous velocity. This is called the Rankine vortex, and it is stable. In fact, however, you develop shear layers at the edge of the disk (c.f. Greenspan), and these can become unstable, giving rise to waves and vortices around the tank.

Examine the structures as you vary $\delta\Omega$. The wavelength for the instability should be roughly $2\pi$ times the shear layer width.

12.804 Large-scale Flow Dynamics Lab
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