Find the dip, at various distances, of the lithosphere due to loading by the Purcell anticlinorium. You could find the derivative of the equation and evaluate that or just calculate a couple of values (within 1 km or so) and look at the difference:

Knowns for the Ovando - Power profile:

$$wb := 700 \cdot m \quad xo := 100 \cdot km \quad xb := 140 \cdot km \qquad pm := 3200 \cdot \frac{kg}{m^3} \qquad ps := 2500 \cdot \frac{kg}{m^3}$$

$$E := 7 \cdot 10^{10} \cdot Pa \quad v := .25$$

$$\alpha := \frac{4}{\pi} \cdot (xb - xo) \qquad \alpha = 50.93 \circ km \qquad D := \alpha^4 \cdot g \cdot \frac{pm - ps}{4} \qquad D = 1.155 \cdot 10^{22} \circ newton \cdot m$$

$$h := \left(D \cdot 12 \cdot \frac{1 - v^2}{E}\right)^{\frac{1}{3}} \qquad h = 12.288 \circ km \qquad x := 0 \cdot km, 10 \cdot km .. 200 \cdot km$$

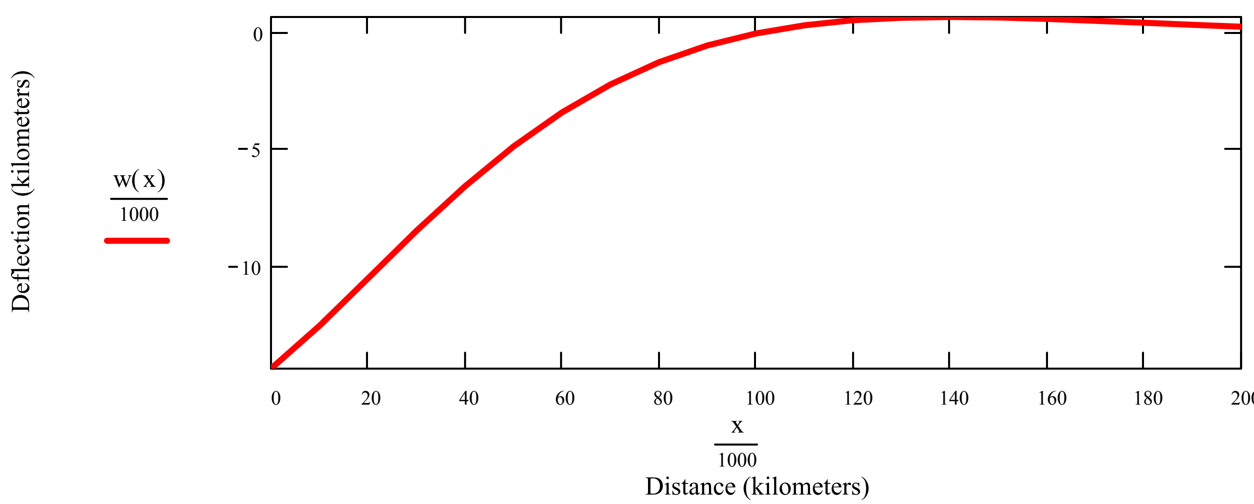
The universal flexural profile:

$$w(x) := wb \cdot \sqrt{2} \cdot e^{\frac{\pi}{4}} \cdot \exp\left[-\frac{\pi}{4} \cdot \frac{x - xo}{(xb - xo)}\right] \cdot \sin\left[\frac{\pi}{4} \cdot \frac{x - xo}{(xb - xo)}\right]$$

Evaluate at x = 0: $w(0 \cdot km) = -14.291 \circ km$

$$wo := w(0 \cdot km) \qquad V := wo \cdot 4 \cdot \frac{D}{\alpha^3} \qquad V = -4.996 \cdot 10^{12} \circ \frac{newton}{m}$$

Like in class.



Next find the dip at 33 km, 66 km, 100 km. The tangent of the dip is the change in flexure divided by the change in distance (dw/dx) evaluated at each of those distances.

$$dip(x) := atan\left(\frac{d}{dx} w(x)\right)$$

$$dip(33 \cdot km) = 10.971 \circ deg$$

$$dip(66 \cdot km) = 6.658 \circ deg$$

$$dip(100 \cdot km) = 2.441 \circ deg$$

Do we get the same thing if we calculate the differences in w(x) directly?

$$atan\left[\frac{(w(33.5 \cdot km)) - w(32.5 \cdot km)}{1 \cdot km}\right] = 10.97 \circ deg$$

looks pretty close.

Now find the wavelength of topography that is 50% compensated for elastic thicknesses of 6 km and 15 km.

$pm := 3250 \cdot \frac{kg}{m^3}$ $pc := 2670 \cdot \frac{kg}{m^3}$ $h := 6 \cdot km$ $D := \frac{E \cdot h^3}{12 \cdot (1 - v^2)}$ $D = 1.344 \cdot 10^{21} \cdot newton \cdot m$

$$\frac{pm - pc}{pm - pc + \frac{D}{g} \cdot \left(\frac{2 \cdot \pi}{\lambda}\right)^4} = .5$$ We want λ. $$\frac{2 \cdot \pi}{\lambda} = \left[\left(\frac{pm - pc}{.5} - pm + pc\right) \cdot \frac{g}{D}\right]^{\frac{1}{4}}$$

Mathcad will solve for a variable, but it refused to so until I simplified this one a bit.

$$\lambda := 6.283185307179586477 \cdot \frac{D^{\left(\frac{1}{4}\right)}}{\left[(pm - 1. \cdot pc)^{\left(\frac{1}{4}\right)} \cdot g^{\left(\frac{1}{4}\right)}\right]} \qquad \lambda = 138.53 \cdot km$$ the wavelength of 50% compensated load with an elastic thickness of 6 kilometers.

$h := 15 \cdot km$ $D := \frac{E \cdot h^3}{12 \cdot (1 - v^2)}$ $D = 2.1 \cdot 10^{22} \cdot newton \cdot m$ Change to an elastic thickness of 15 kilometers.

$$\lambda := 6.283185307179586477 \cdot \frac{D^{\left(\frac{1}{4}\right)}}{\left[(pm - 1. \cdot pc)^{\left(\frac{1}{4}\right)} \cdot g^{\left(\frac{1}{4}\right)}\right]} \qquad \lambda = 275.421 \cdot km$$ the wavelength of 50% compensated load with an elastic thickness of 15 kilometers.