

Science 1 Physics Assignment # 2:

Wake Waves

Sunday 04 Oct 2009, aboard the MV *Frances Barkley*

You have read chapters on, heard lectures about, and seen lots of cool computer simulations of **waves**. Now you're going to observe, analyze and discuss the real thing.

On the boat trip home from Bamfield (and, for extra credit, on the ferry ride back to Vancouver) you should record your observations, measurements and estimates as described below, discuss them with your classmates (form groups for this purpose, as usual) and reach tentative interpretations and/or conclusions about the WAVES IN A BOAT'S WAKE.

When you get home, get some sleep! Rest up for Monday. Then (on Monday) *write up a short report* (preferably in L^AT_EX)¹ summarizing this exercise to hand in by Tuesday morning before class.

1. Estimate the speed of the ship in m/s (with uncertainty explicitly expressed, as always). Make sure you can explain your estimate as well as your uncertainty.
2. See how many distinct wave patterns you can distinguish in the **wake** of the ship. Think up a nice descriptive *name* for each one.
3. Estimate the angle between the *ship's velocity* and the *direction of propagation* of each type of wave in her wake. Draw a sketch (viewed from above) and describe the dynamics you observe. (Does the wave “keep pace” with the ship, fall behind or overtake her?)
4. Estimate the propagation speed of each type of wave.
5. See if you can draw any conclusions about the “dispersion relation” of deep water waves — *i.e.* is the propagation speed independent of wavelength, as for light or idealized sound waves? If not, what sort of dependence do you observe?²

¹You can “staple in” your Figures (sketches *etc.*) on separate pieces of paper if you don't know how to generate image files and incorporate them into L^AT_EX documents.

²Note: looking stuff up on *Wikipedia* does **not** constitute “observing”. You are welcome to use such references to *inform* your own observations, but make sure to distinguish what *you* see from what the reference says you *should* see. Otherwise it's not real science!