From: Andreas Muenchow <muenchow@udel.edu>
Subject: **Wave Practical Exercise: Step-2**
Date: October 2, 2008 12:17:33 PM EDT
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1 Attachment, 32.3 KB

Brian, Chris, Dack, Matt, Amy,Erick, and Jared:

While still in Lewes, I reviewed the after-class reports (data sheets, really) of the Lewes 2 groups and returned them in annotated form. I will do the same for the Newark group later this afternoon. Please be assured that this preliminary report on your data will NOT be graded, however, your 6 minute oral presentation (no more than 3 slides) of your results to the other groups, due next tuesday, will be. A one-page abstract or executive summary should be made available to the class at that time (or prior if possible) also. The abstract should concisely state your objective and approach, as well as your main findings. It should not contain detailed graphs, as you will cover those in the presentation. A final report is due thursday, Oct.-9) which would consist of edited versions of the abstract, the graphs of the presentation, and data tables. Paper versions of carefully crafted and labeled plots of the actual data are acceptable as are "eye-balled" regressions. After all, this is not a formal statistics class.

Perhaps helpful hints on how to approach the problem at hand:

In order to design experiments smartly (e.g., to determine if the java code has or has not been hacked into and/or is valid for linear surface gravity waves), it will help, if you review and understand the theoretical under-pinnings of linear waves. These are described in chapter-9 of Knauss (1997) and perhaps even more elaborate in my lecture notes from last tuesday. For example, the amplitude of the wave does NOT enter in any of these discussions, except that "linear" in linear waves refers to assumption that the ratio of wave amplitude is small relative to the smaller of water depth and wave length. So, ratios often matter in dynamics, especially ratios of properties with like dimensions (like wave amplitude measured in meters and water depth measured in meters and wavelength measured in meters) ... non-dimensional numbers.

I like you to collect, tabulate, and graph as many "data points" as are needed to discern patterns. One group had 5 values with wave lengths from 11m to 20 m while another group had 7 values with wavelengths from 8m to 83m, if me recollection is correct. About 30 such values may be a good number, but it really depends on how smartly you design your experiments).

Part of any experimental design is a hypothesis to be test (like shallow water waves obey c=sqrt(gH), however, deep water waves do not. This hypothesis must then be converted into a "graph" where you expect a "linear fit" of two properties that derive from measurements (wave period or wave length and/or squares, logs, sines, and cosines thereof). Some algebra will be needed to "derive" the relation between two measured properties. The constant of proportionality in this "linear regression" has an expected value that depends on parameters of the problem and/or constants. So, chose your measurements carefully to make the largest possible range of waves which the code on the web may have been changed. Perhaps the waves at the web-site are indeed linear surface gravity waves, but waves that travel on an interface different from the air-ocean interface. An internal wave traveling on the interface of two fluids of different densities such as oil on water (or warm and fresh surface mixed layer water over cold, salty ambient shelf water off New Jersey from Erick and Matt's last cruise come to mind ...

Please make sure to explore and check both shallow and deep water waves for both. There is additional information to be gained from measurements of phase and group velocities as well.

Please do not hesitate to ask me questions or show me graphs and data to review at any time.

andreas

P.S.: I attach the original assignment here as well.

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