

## CE 717 RIVER MECHANICS

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### Homework #6 – Waves and Tides - Chapter 12 due May 12, 2009

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#### Problem #1 (50%) *Wave celerity*

Consider two waves with a period of 2 s and 20 s in a 25 ft deep river. Determine the period, celerity and wavelength of both waves. Are these shallow or deep water waves? Calculate the group celerity of these two waves and compare with the wave celerity. Also calculate the ratio of the horizontal amplitude of the elliptical motion of fluid particles between conditions near the bed and near the free surface for these two waves. Present a summary table in English Units and discuss the results.

#### Problem #2 (50%) *Wind waves*

Consider the waves generated from a Hurricane affecting the river flow of the Mississippi River. Estimate the depth and fetch length for the reach of the Mississippi River that you modeled in your last homework. Estimate the maximum wind speed during hurricane Katrina and estimate the wave characteristics for a storm of duration of 6 hours. Determine the following in SI units.

1. What is the wave amplitude.
  2. How long does the storm need to last for the waves to fully develop.
  3. Estimate the celerity of these waves.
  4. Estimate the period of these waves.
  5. Estimate the wavelength of these waves.
  6. Are these shallow or deepwater waves?
  7. What is the energy of these waves.
  8. What is the group celerity of these waves.
  9. Are these waves fetch limited or depth limited?
  10. Would these waves cause erosion of the river bed or the river banks?
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