CE 540 Unsteady Flows in Rivers and Pipe Networks,
Homework 4 / Mini-Project 4, Fall 2013
Instructor: Arturo Leon

Name of student: _____ **Due date**: December 03

1. **Mini-project:** For this Mini-project, you will use the TELEMAC-2D model. Considering the flow hydrographs of Mini-project 2 (Unsteady HEC-RAS model), and assuming that there is a waterfall at the downstream end of lower reach (Baxter River),
   (a) Provide recommendations for mitigating floods in the urban area shown in the Geo-RAS file adjacent to Baxter River (e.g., provide locations and heights of levees to avoid flooding).
   (b) Compare your results with the steady and unsteady HEC-RAS results and discuss the similarities and differences.

   - The data for the Baxter River can be downloaded from http://web.engr.oregonstate.edu/~leon/Teaching_transients.html or from Blackboard (data for Tutorial 1)

   - State your assumptions.

Homework:

2. A 2,400-ft-long, 2-ft-diameter pipeline conveys water from a hilltop reservoir to an industrial site. The pipe is made of ductile iron, has an outside diameter of 2.25 ft, and has expansion joints. The flow rate is 30 cfs. Determine the maximum water hammer pressure (in psi) that is likely to occur if the downstream flow valve is closed in 1.05 seconds. Also determine the water hammer reduction (in psi) if a diverter is added that reduces the flow rate from 30 cfs to 10 cfs almost instantly on valve closure.

3. A 0.5-m-diameter concrete pipe (5.0 cm wall thickness with rigid pipe walls) carries water 600 m before discharging it into another reservoir. The surface elevation of the downstream reservoir is 55 m lower than the supply reservoir. A gate valve just upstream of the lower reservoir controls the flow rate. If the valve is closed in 0.65s, what is the maximum water hammer pressure?

4. A pipeline is being designed to withstand a total maximum pressure of 2.13×10^6 N/m^2. The 20-cm pipeline is ductile iron and conveys water at 40 L/s. Determine the required thickness of the pipe wall if the operational head on the pipeline is 40 m and also subject to water hammer if the flow control valve on the downstream end is closed suddenly. Assume that the longitudinal stresses will be negligible when the pipe is installed.