# CHEN3600 – Computer-Aided Chemical Engineering Spring 2012

# Chemical Engineering Department Lab 7

**T.D. Placek Auburn University**

**Lab 7**

**Modeling Tank Inflows and Outflows**

You may work with a partner on this assignment. (Max group size = 2)

Consider the following general problem type:

Two cylindrical tanks (D1, H1, D2, H2) are located near each other (separated by S). The top of Tank 1 is higher than Tank 2. The bottoms of the tanks may be at different elevations (B1, B2). The tanks contain water initially at depths (Ho1, Ho2).

On the outer surface of Tank 1 nearest Tank 2 there are two holes. These holes are characterized by their diameter d1 and d2 and have an elevation measured with respect to the bottom of the tank of h1 and h2. It is possible that water can leave either or both holes and fall into Tank 2.

On the outer surface of Tank 2 furthest from Tank 1 there is one hole. This hole is characterized by its diameter d3 and has an elevation measured with respect to the bottom of the tank of h3.

Consider (for the current assignment) that there will be input water supplied to Tank 1 equal to the mass (volume) of water leaving Tank 1 via Hole 2.

Develop a model which simulates the unsteady state behavior of this situation. Your solution should employ potential flow relationships.

Hint: Your model should employ consistent standard units throughout (ft-s-lb) or (m-s-kg). Data provided in non-standard units should be converted in your program so that the program data can be easily verified and changed.

Senario #1

Tank 1: D1=18”, H1=36”, B1=12”, Ho1=32”

Tank 2: D2=12”, H2=18”, B2=0”, Ho2=0”, S=12”

Hole 1: d1=1”, h1=24”

Hole 2: d2=0.5”, h2=18”

Hole 3: d3=0.5”, h3=3”

Run the following cases:

Case (1) Ho1 = 32” Ho2 = 0”

Case (2) Ho2 = 35” Ho2 = 6”

Your solution should be presented as a script and published as a pdf. Provide graphs showing the important time-dependent behavior.