

CIVE 716 EROSION AND SEDIMENTATION

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Assignment #2 Chapters 4 and 5 due October 2, 2009

Problem # 1 (20%)

What is the lift force in kN on a 3 m diameter half-spherical tent located in Windsor, CO, under the maximum wind speed of 160 km per hour.

Problem # 3 (60%)

- A. Consider two different quartz particles with exactly the same volume 1000 cm^3 , thus the same weight. Particle A is half spherical with the flat face horizontal and Particle B is half-cylindrical with a square horizontal flat face. Sketch the particles and determine their dimensions in a summary table. Both particles are then placed side by side at the bottom of a flume, with the flat face horizontal. The cylindrical particle is oriented normal to the flow velocity. Assume that the flow velocity under the particles equal zero, and neglect viscous forces. Determine the net vertical force and the net horizontal force and summarize the results in a table. Finally, determine the critical flow velocity for both particles from the sum of forces along the vertical.
- B. Repeat the Problem 3A for a particle that is 1000 times smaller in diameter. Consider that the fluid is now highly viscous and Newtonian. Examine two cases for the side-shear on Particle B: (1) no side shear; and (2) the side shear equal to the shear stress at the top of the particle. Determine the net vertical and horizontal forces on the particle. Can you define the velocity describing beginning of motion?

Problem # 4 (20%)

Program a suitable formula to calculate the settling velocity of silt and gravel size particles. Assume $G = 2.65$ and consider two different water temperatures at 5°C and 25°C . Present the results in a summary table. Which size fractions settle at different velocities under different temperatures.
