

1 Programming

In this assignment you will simulate shallow water. I have provided some code to start you off as usual, in the directories `compute_water` and `opengl_water`. You will also need to write code in a directory `renderman_water` to produce high quality output. Note that `opengl_water` is functionally complete, so you do not need to add code there, but you may want to if it helps you visualize problems.

2 Analysis

(1—rigid bodies) Derive the impulse required to not just stop relative motion at a contact point between two rigid bodies (static friction) but also to stop the rolling of one object over another (static rolling friction).

(2—rigid bodies) Given an arbitrary rigid body with a particular mass and inertia tensor, derive a set of point masses whose union possesses the same mass and inertia tensor.

(3—shallow water) In this assignment you use a MAC grid to discretize the shallow water equations. Discuss problems that could arise if you used a colocated grid (i.e. one where all variables— u , w , and h —are located at the same positions) and central difference formulas. Hint: look at a very high frequency heightfield.

(4—shallow water) Repeat the traveling square-pulse demo from class with the semi-Lagrangian advection method. Use both linear interpolation and the minmod-limited cubic interpolation; compare your results.

3 Handing It In

This is the same as assignment 1: make a movie, send me the URL, send me the code, and hand in the written work, before I get in the morning after the due date.