

Problem Set 5

Haptic Rendering of Surface Properties

Out: 10.18.06

Due: 10.25.06

For each problem, submit a printout of your edited code (between the lines "START EDITING HERE" and "STOP EDITING HERE") and email the same code snippet to grow.david@gmail.com by the due date. Do not print out or submit the entire .cpp file. In your email, use the subject line "530.651: PS5 YOURLASTNAME", and attach text files containing the edited code, called "PS5_1a_YOURLASTNAME.TXT", "PS5_1b_YOURLASTNAME.TXT", etc. To grade your work, we will copy and paste your code snippets into our .cpp file and test the haptic feedback by hand. We will also look at the code to evaluate the efficiency, generality, and elegance of your solution.

1. (30 pts.) Create a horizontal plane at a height of $y = 0$ with the following surface properties. For each surface property, explain the algorithm you used, and answer the questions.
 - a. (10 pts.) Damping parallel to the surface. Sketch the force vs. velocity profile. What is the maximum damping you can display and remain stable?
 - b. (10 pts.) Coulomb friction parallel to the surface. Sketch the force vs. velocity profile. How does it feel? What is wrong?
 - c. (10 pts.) A version of friction that feels like Coulomb friction parallel to the surface but uses a different algorithm from either of the ones above. Sketch the force vs. velocity profile. Explain your choice. How does it feel different from the above examples?
2. (20 pts.) Create a horizontal plane at a height of $y = 0$, and generate a highly textured surface using any of the methods described in lecture. Explain clearly the method you used, giving sketches and dimensions where appropriate. Describe in words what it feels like.