

Lecture 23: Physics, L-systems, Texture Synthesis – Review Questions

- In physical simulation, the world is simulated in discrete time-steps. Why is it important to maintain small time-step? In what ways can physics be violated if your time-step is too large?
- Calculate the collision response of a stationary sphere of mass m_1 when it is hit by another sphere of mass m_2 and velocity v_2 .
- Describe L-systems. What makes them well-suited for generating natural objects like trees and plants?
- Perlin noise is popular for generating natural phenomenon like terrain or clouds. What makes Perlin noise better than other types of noise, such as white noise (every pixel is an independently sampled random number)?
- Example-based texture synthesis was inspired by a Markov-chain based text synthesis approach proposed by Claude Shannon in the 1948. Describe an algorithm for synthesizing text by computing statistics over a large text corpus.
- Why can't Shannon's text synthesis algorithm be directly applied to texture synthesis. Give two reasons. How are these issues solved in texture synthesis?
- The size of the neighborhood window is a critical parameter. How does it control the resulting texture image? What happens if we set the window too large? Too small?