

Procedural Textures

CSCI 4239/5239

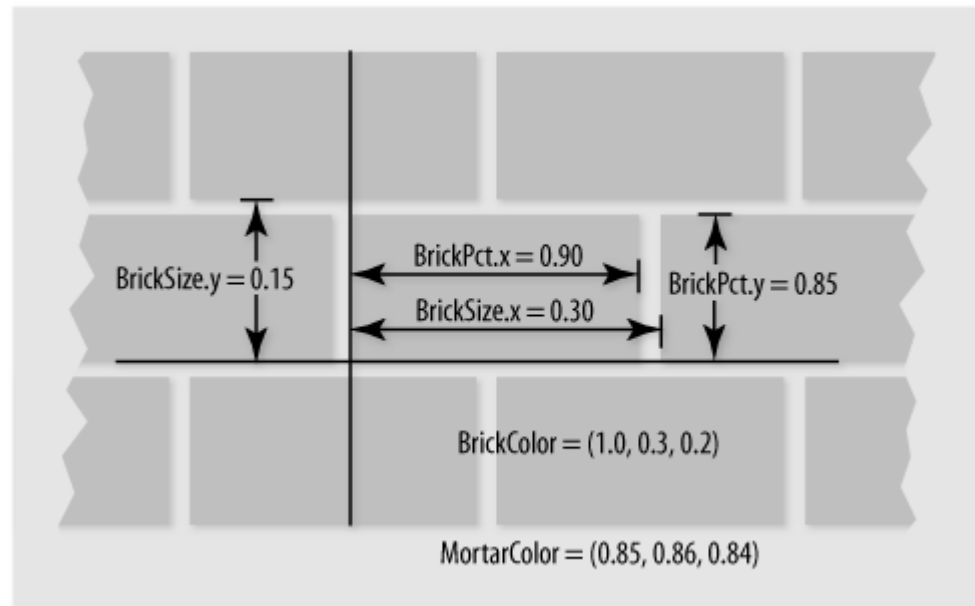
**Advanced Computer Graphics
Spring 2025**

What is a procedural texture?

- A procedural texture is a shader program that generates the texture using a series of calculations
 - You can access textures from a shader, but this is calculates pixel colors on the fly
- Examples:
 - Brick shader
 - Mandelbrot shader
 - The much cooler shader you will write for homework 2

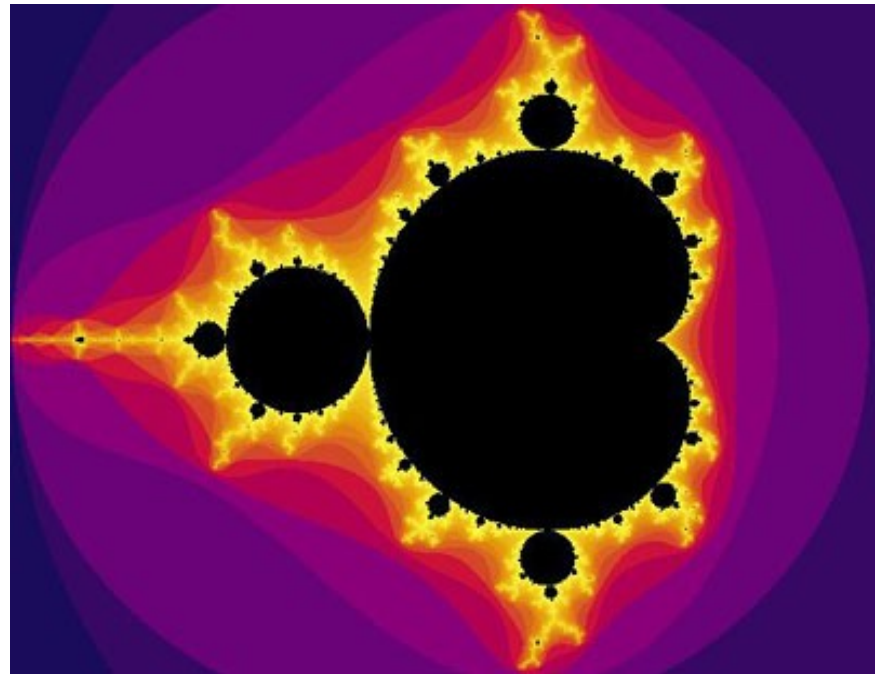
Brick Shader (Orange Book Ch 6)

- Uses scalar Phong shading for lighting
- Calculates brick/mortar based on model coordinates



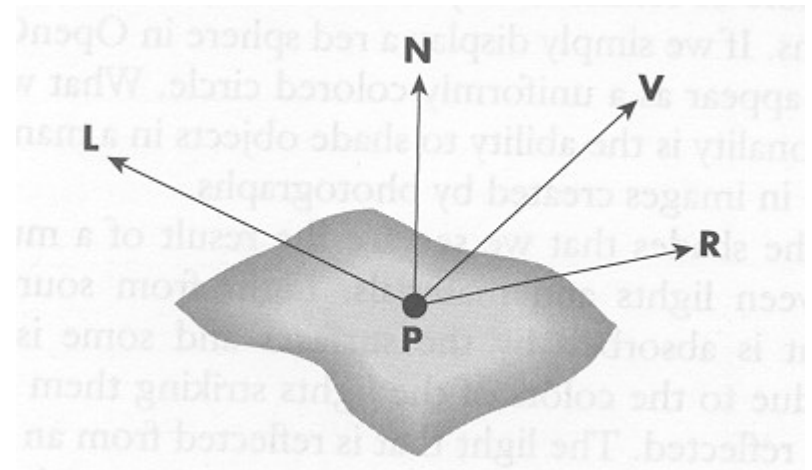
Mandelbrot Shader

- Complex Quadratic Polynomial Sequence
 - $Z_{n+1} = Z_n^2 + c$
- For which values of c is the sequence bounded
- This is a fractal set
 - Finite area
 - Boundary is infinite
 - Self-similar



Phong Lighting

- L light source
- N normal vector for surface
- R reflected light
 - $R = 2(L \cdot N)N - L$
- V viewer (eye)
- Intensity $(V \cdot R)^S MC$
 - S shininess
 - M material reflection coefficient
 - C color of light source
- Calculated independently for R,G,B



Assignment 2

- Build your own procedural texture
 - Text Chapter 8
 - Google
 - IMPROVE WHAT YOU FIND
 - Justify every instruction
- Watch out for noise functions
 - GLSL functions usually not implemented
 - Always returns 0
 - We will cover noise textures later on