

# **Procedural Textures**

**CSCI 4239/5239**

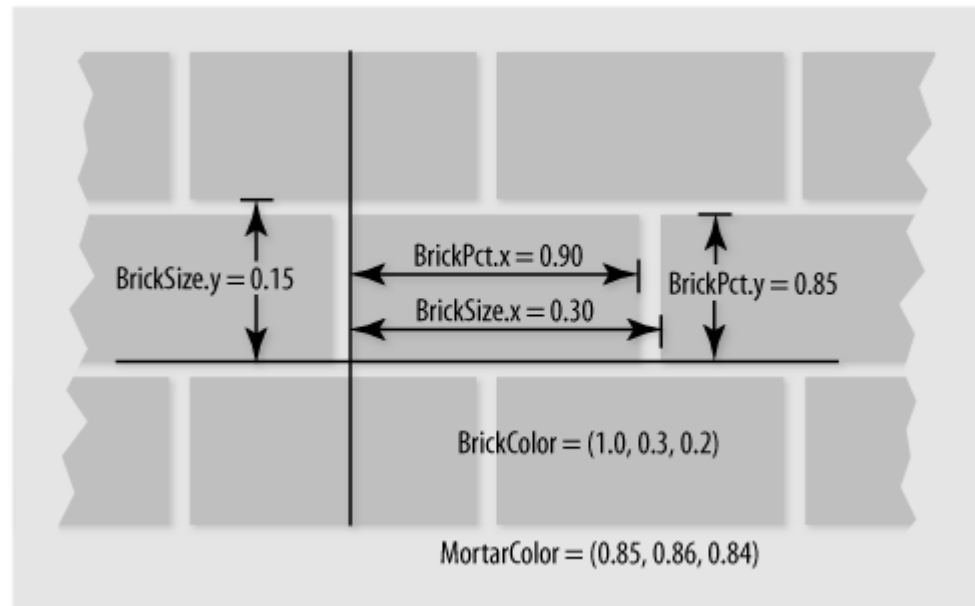
**Advanced Computer Graphics  
Spring 2020**

# 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

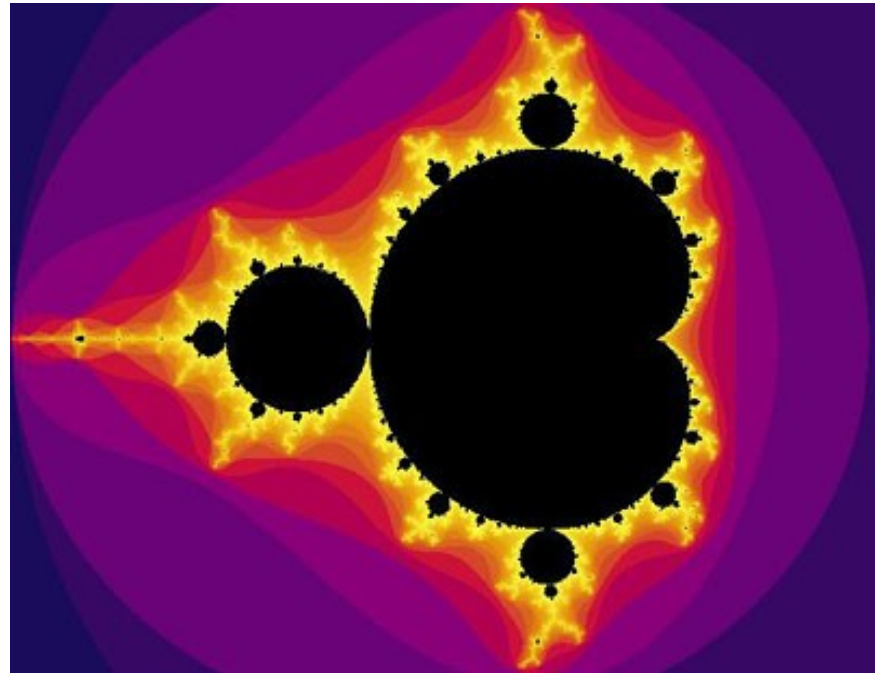


# Mandelbrot Shader

- Complex Quadratic Polynomial Sequence

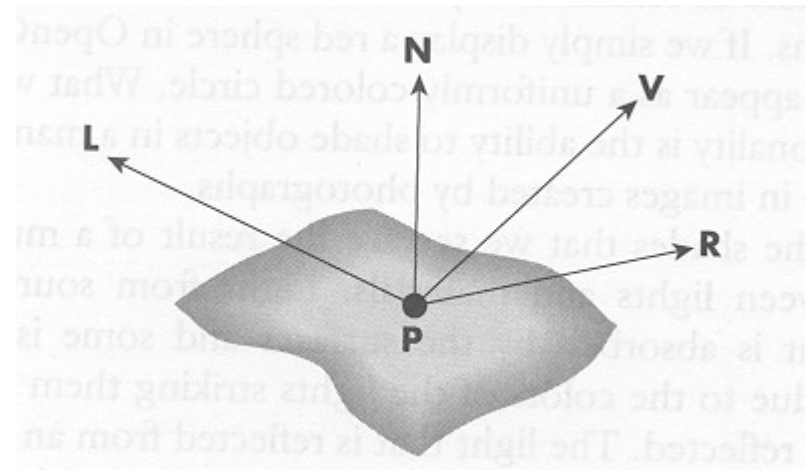
$$- z_{n+1} = z_n^2 + c$$

- 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
- Volunteers needed