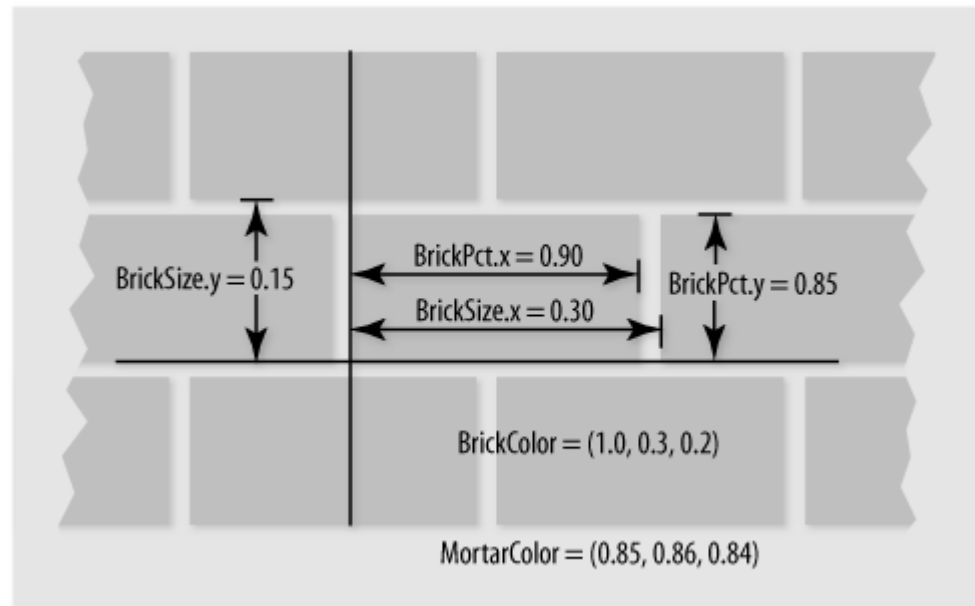# Procedural Textures

CSCI 4239/5239
Advanced Computer Graphics
Spring 2019

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
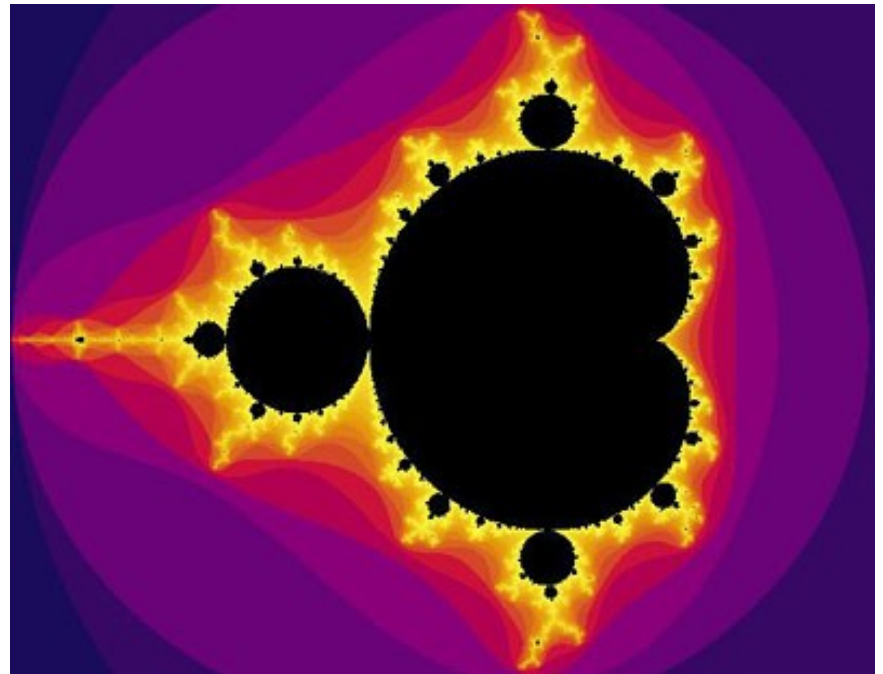- Calculates brick/mortar based on model coordinates

BrickSize.y = 0.15

BrickPct.x = 0.90

BrickPct.y = 0.85

BrickSize.x = 0.30

BrickColor = (1.0, 0.3, 0.2)

MortarColor = (0.85, 0.86, 0.84)

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*•*N*)*N* − *L*
- *V* viewer (eye)
- Intensity (*V*•*R*)^S*MC*
  - *S* shininess
  - *M* material reflection coefficient
  - *C* color if light source
- Calculated independently for R,G,B
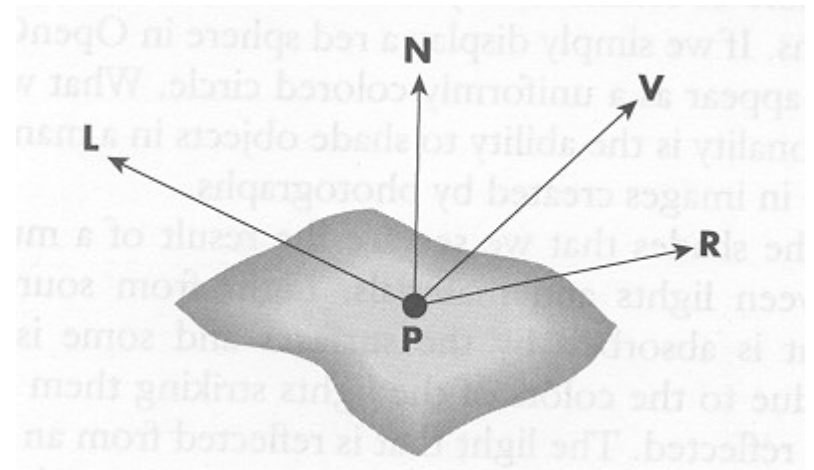
Assignment 2

- 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