Mixing

Mike Bailey
mjb@cs.oregonstate.edu
Oregon State University

1/4/2016

// create a value of 0. or 1. from the value of x wrt edge:
float t = step( float edge, float x );

// create a value in the range 0. to 1. from the value of x wrt edge0 and edge1:
float t = smoothstep( float edge0, float edge1, float x );

// use the returned value from step() or smoothstep() to blend in0 into in1:
T out = mix( T in0, T in1, float t );

“SmoothPulse” in a Fragment Shader

in float uX, uY;
in vec4 vColor;
in float vLightIntensity;
uniform float uA;
uniform float uP;
uniform float uTol;
const vec4 WHITE = vec4( 1., 1., 1., 1. );

void main( )
{
    float f = fract( uA*vX );
    float t = smoothstep( 0.5-uP-uTol, 0.5-uP+uTol, f )  - smoothstep( 0.5+uP-uTol, 0.5+uP+uTol, f );
    gl_FragColor = mix( WHITE, vColor, t );
    gl_FragColor.rgb *= vLightIntensity;
}

Why Do These Two Curves Match So Closely?

The Taylor Series expansion of \( y = \sin(\frac{\pi x}{2}) \) around x=0.5 is:

\[
y = \left( \frac{1}{2} \cdot \frac{\pi^2}{2} \right) x^2 - \left( \frac{1}{2} \cdot \frac{\pi^4}{4} \right) x^4 + \cdots
\]

which is pretty close to: \( y = 3x^2 - 2x^3 \)

Fun With One

The Taylor Series expansion of \( y = \sin(\frac{\pi x}{2}) \) is:

\[
y = \frac{\pi}{2} x - \frac{\pi^3}{48} x^3 + \frac{\pi^5}{3840} x^5 + \cdots
\]

Cubic vs. Quintic

Both go from 0. to 1.
Both have initial and final slopes of 0.
The quintic has initial and final curvatures of 0.