Mixing

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

```glsl
in float vX, vY;
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;
}
```

![Graph](image_url)
Fun With One

Moral: There are many ways to turn \([0.-1.]\) into \([0.-1.]\)
Why Do These Two Curves Match So Closely?

\[ y = \sin^2\left(\frac{\pi}{x}\right) \]

\[ y = 3x^2 - 2x^3 \]

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

\[
y = \left(\frac{1}{2} - \frac{\pi}{4} + \frac{\pi^3}{96}\right) + x\left(\frac{\pi}{2} - \frac{\pi^3}{16}\right) + x^2\left(\frac{\pi^3}{8}\right) - x^3\left(\frac{\pi^3}{12}\right)
\]

\[ = .038 - .37x + 3.88x^2 - 2.58x^3 \]

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

\[ y = 10x^3 - 15x^4 + 6x^5 \]

\[ y = 3x^2 - 2x^3 \]