Geometric Morphing with the Vertex Shader

Oregon State University

Mike Bailey

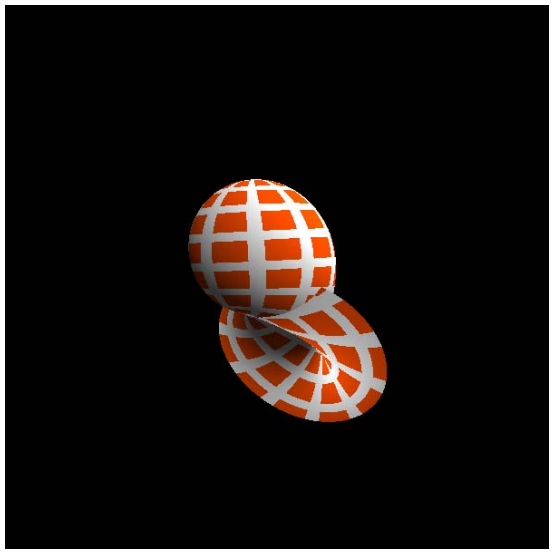
mjb@cs.oregonstate.edu

Oregon State University
Computer Graphics

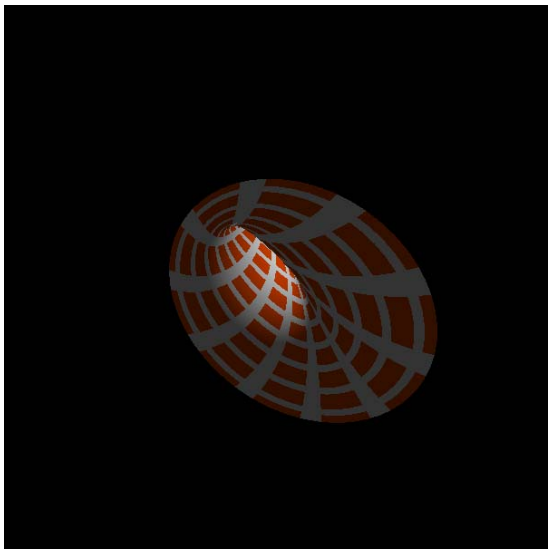
Morphing a Sphere into a Circle

Blend = 0.00

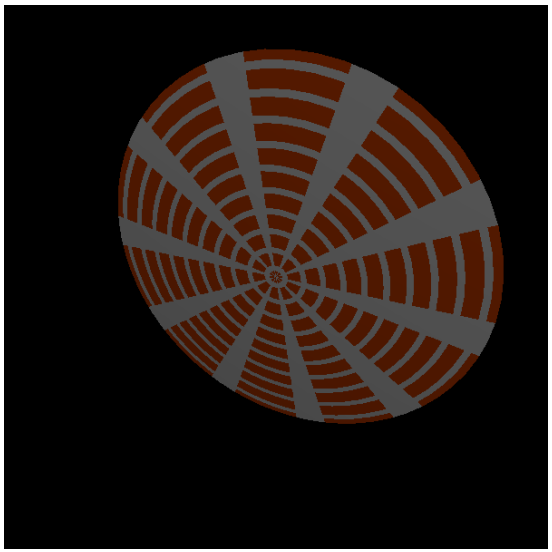
Blend = 0.25



Blend = 0.50



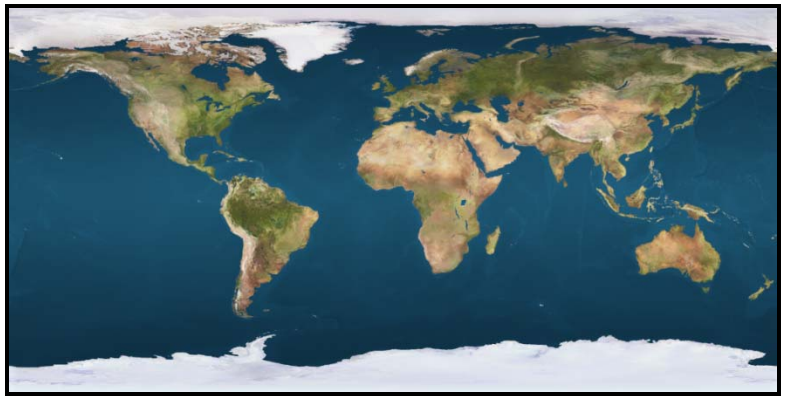
Blend = 0.75



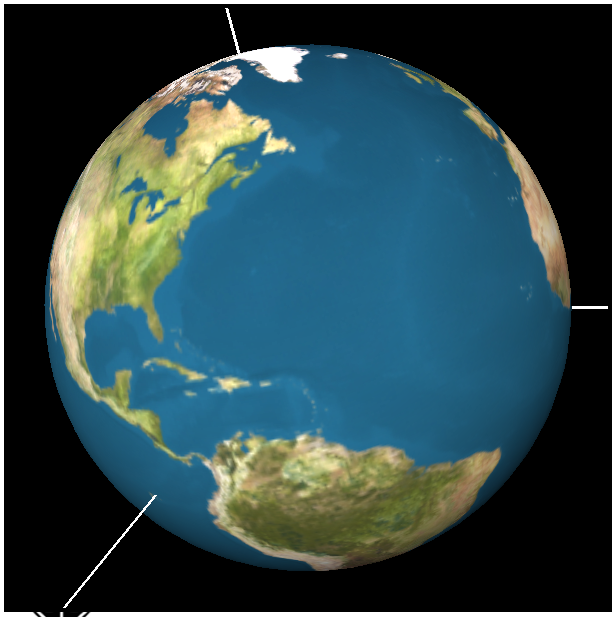
Blend = 1.00

```
out vec2        vST;
out float       vLightIntensity;
out vec4        vColor;
const float TWOPI = 2.*3.14159265;

// original model coords (sphere):

vec4 vertex0 = aVertex;
vec3 norm0   = aNormal;

// circle coords:

vST= aTexCoord0.st;
float radius = 1 . -  vST.t;
float theta = TWOPI * vST.s;
vec4  circle = vec4( radius*cos(theta), radius*sin(theta), 0., 1. );
vec3  circlenorm = vec3( 0., 0., 1. );

vST += vec2( OffsetS, OffsetT );

// blend:
vec4 theVertex = mix( vertex0, circle, Blend );
vec3 theNormal = normalize(  mix( norm0, circlenorm, Blend )  );

// do the lighting:
vec3 tnorm      = normalize( vec3( uNormalMatrix * theNormal ) );
vec3 LightPos = vec3( 5., 10., 10. );
vec3 ECposition = vec3( uModelViewMatrix * theVertex );
vLightIntensity  = abs( dot( normalize(LightPos - ECposition), tnorm ) );
if( vLightIntensity < 0.2 )
                vLightIntensity = 0.2;

vColor = aColor;
gl_Position = uModelViewProjectionMatrix * theVertex;
```

A possible vis application ??



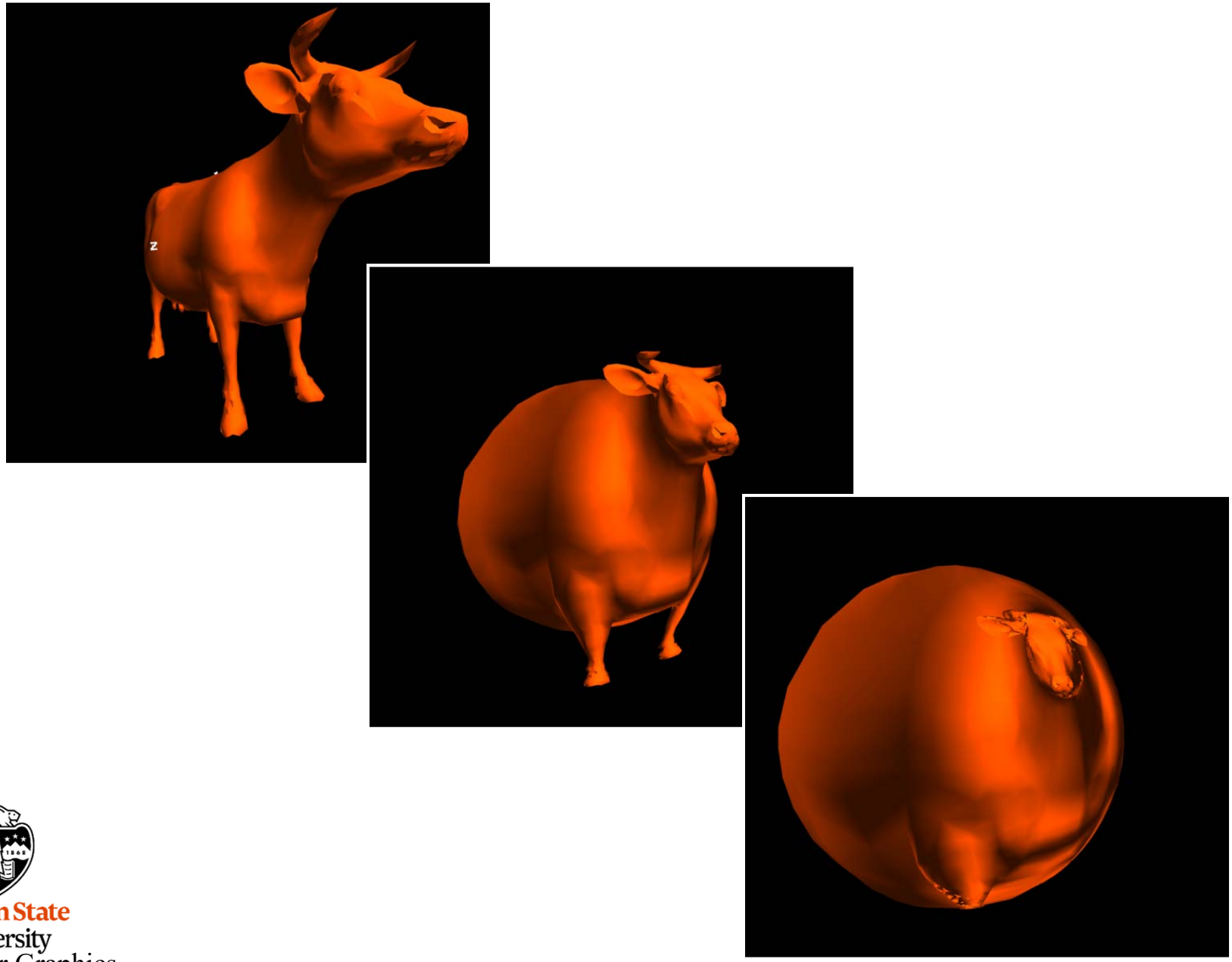
Original texture map



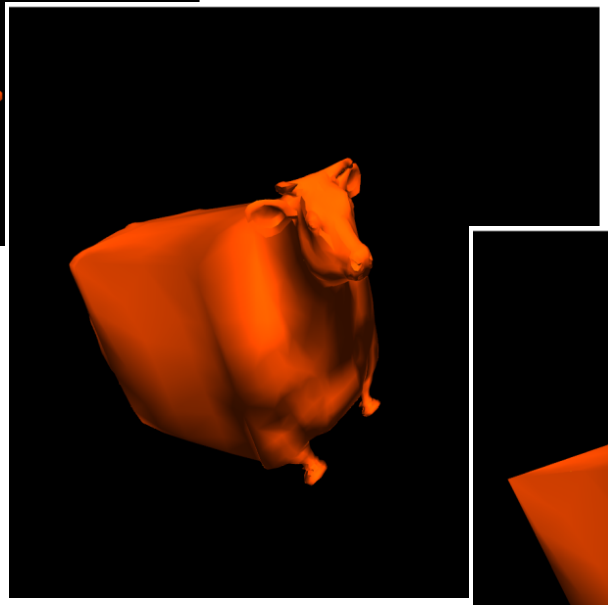
Mapped onto a Sphere

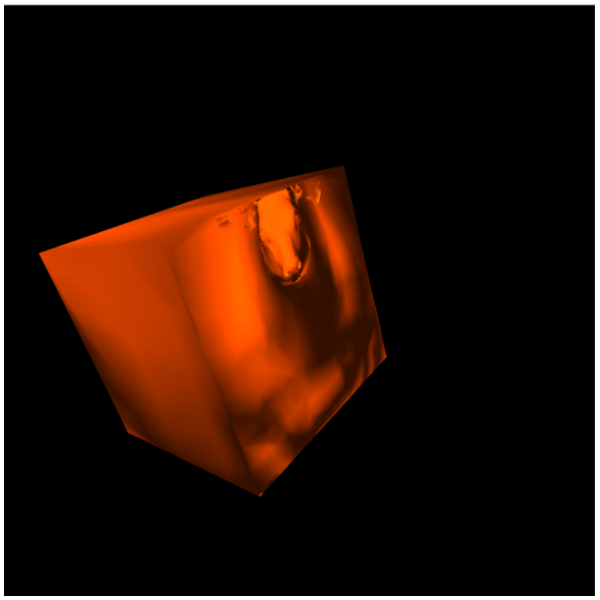
Morphed into a Circle

Morphing a Cow into a Sphere



Morphing a Cow into a Cube





```
const float SIDE = 2.;

vec4 vertex = aVertex;
vertex.xyz *= 4. / length(vertex.xyz);
vertex.xyz = clamp( vertex.xyz, -SIDE, SIDE );
```

Note: the “face” in the cube cow is there because the normals were not morphed into cube normals – they were left as cow normals