Computer Graphics Shaders – CS 557

Project-4

Cube Mapping Reflective and Refractive Bump-mapped Surfaces

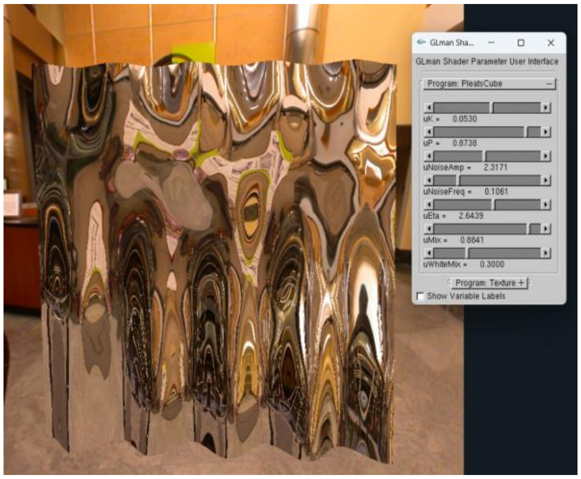
Name: Akhil Sai Chintala

ONID: chintala@oregonstate.edu

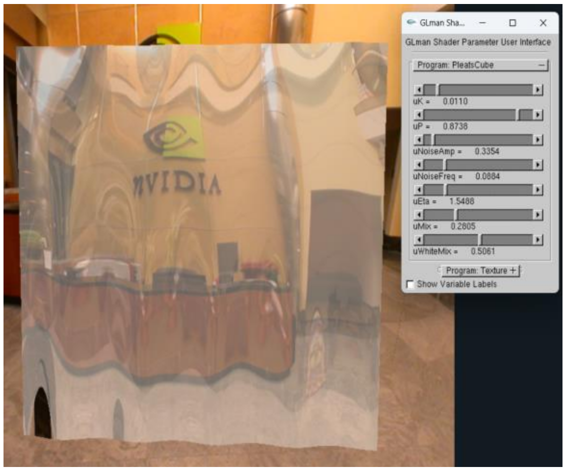
- **What you did and explaining why it worked this way**

  I have followed the instructions given on the resources page and used class notes and written the code for the vertex shader code which actually calculates a new vertex position by modifying the original vertex position based on the values of uK and uP. The program then calculates the position of the vertex in eye coordinates (ECposition), as well as the tangents and the normal to the surface at that point. Then, I have set the values for vNs, vEs, and vMC to the calculated normal and tangents, and the position of the vertex in model coordinates, respectively and added gl_Position variable to the new vertex position in clip coordinates by multiplying it with the model-view-projection matrix. Similarly for the fragment shader code, I have calculated a new surface normal by adding a noise component to the original normal, using the values of uNoiseAmp and uNoiseFreq. The program then rotates the new normal by a random angle about the x and y axes, using the values of nvx and nvy from the Noise3 sampler, respectively. The resulting normal is then transformed into eye coordinates using the gl_NormalMatrix and calculated the reflection and refraction vectors based on the transformed normal and the normalized eye vector (vEs). The program uses the reflection vector to sample the cube map texture (uReflectUnit) to obtain the reflection color (reflectColor). The code mixes the refraction and reflection colors using the mixing factor (uMix) and also uses the white mix factor (uWhiteMix) to add a white color component to the refraction color before mixing.

- **Side-by-side images showing different values for the input parameters.**

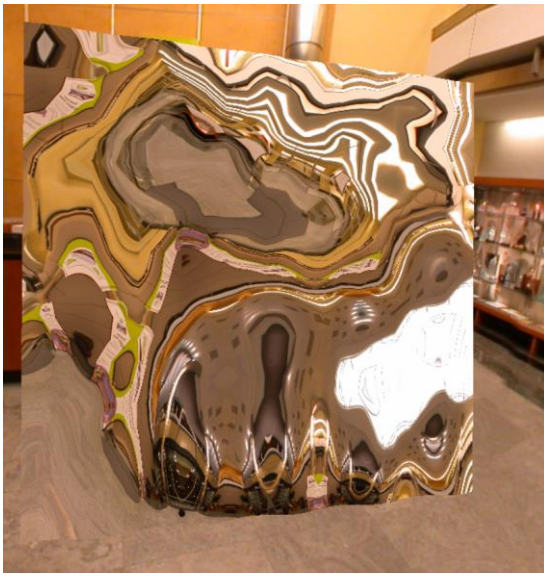


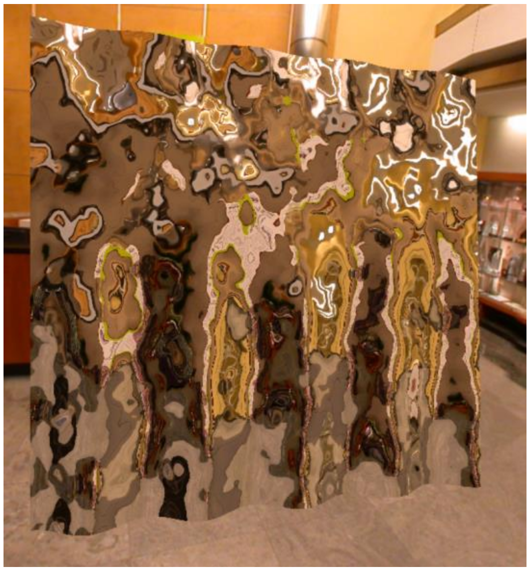
uK = 0.0530
uP = 0.8738
uNoiseAmp = 2.3171
uNoiseFreq = 0.1061
uEta = 2.6439
uMix = 0.8841
uWhiteMix = 0.3000



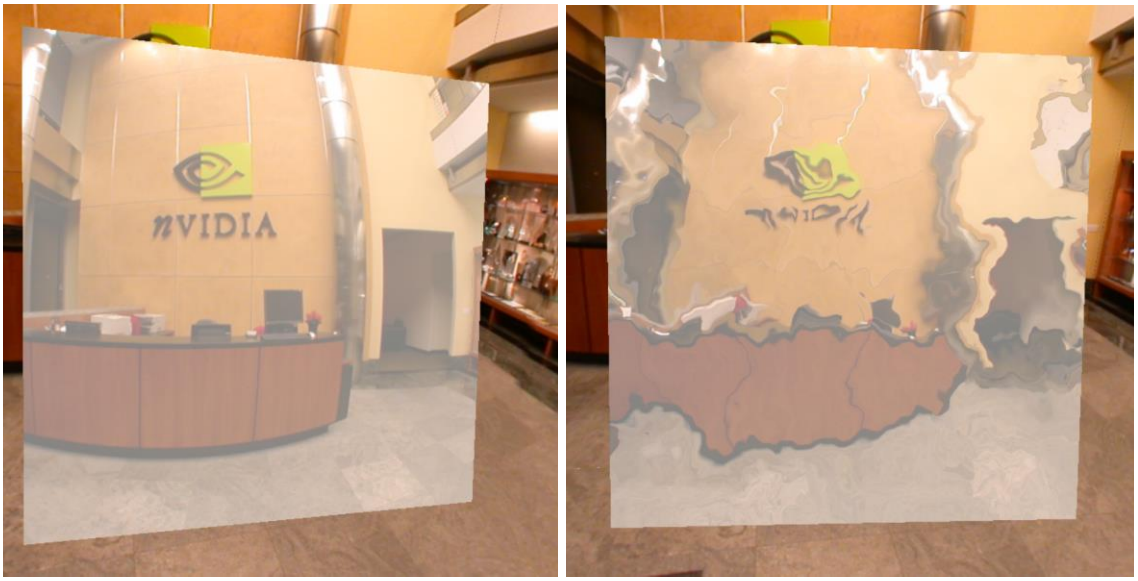
uK = 0.0110
uP = 0.8738
uNoiseAmp = 0.3354
uNoiseFreq = 0.0884
uEta = 1.5488
uMix = 0.2805
uWhiteMix = 0.5061

- **Image(s) showing that your reflection is correct.**

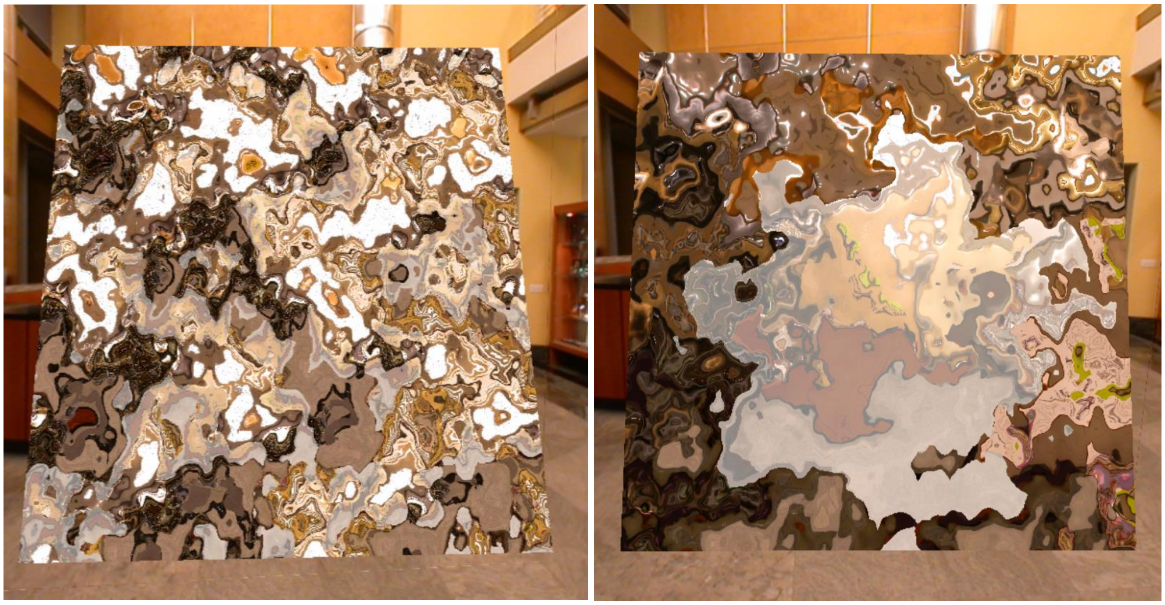




- **Image(s) showing that your refraction is correct.**



- **An image showing that you can mix the reflective and refractive outputs.**



Video Link:

https://oregonstate.zoom.us/rec/share/MQFx78MmTyskBWitVe8AbxxmJUbRrh_3d6Hxpqio7DzSky6m_DKz4z3ajCDyVE-X.Rn4fLpvN0uSWcD6m