



Rendering Marble

Zahra Ghavasieh



Problem Description

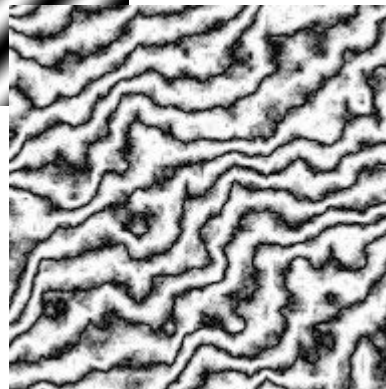
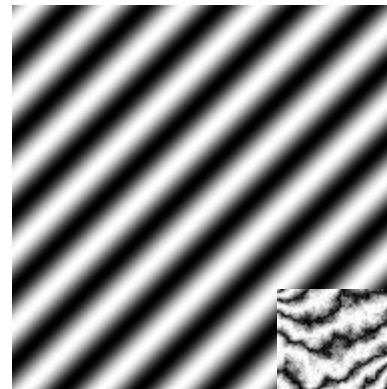
Use a variety of techniques to render a marble texture in real time.





Procedural Texture

- Use a sine pattern as a base and apply turbulence (via a noise function) to create marble veins
- Other options: texture mapping



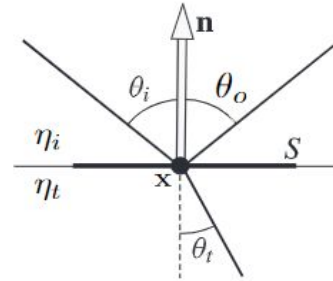


Subsurface Scattering

- Real time approximations
- Nvidia's Depth Maps approach

Reflection

- Fresnel Reflectance in real time
- Schlick Fresnel Approximation
(specular reflection coefficient R)



$$R(\theta) = R_0 + (1 - R_0)(1 - \cos \theta)^5$$

where

$$R_0 = \left(\frac{n_1 - n_2}{n_1 + n_2} \right)^2$$



References

Procedural Texture:

- <https://lodev.org/cgtutor/randomnoise.html>
- [http://physbam.stanford.edu/cs448x/old/Procedural_Noise\(2f\)Perlin_Noise.html](http://physbam.stanford.edu/cs448x/old/Procedural_Noise(2f)Perlin_Noise.html)

Reflections:

- <https://belcour.github.io/blog/slides/2020-brdf-fresnel-decompo/index.html#/5/0/0>

Subsurface Scattering:

- <https://developer.nvidia.com/gpugems/gpugems/part-iii-materials/chapter-16-real-time-approximations-subsurface-scattering>

The background of the slide is split diagonally from the top-left to the bottom-right. The upper-left portion is a solid light gray, while the lower-right portion features a detailed black and white marble pattern with swirling veins. A thin vertical gray line is positioned to the left of the text.

Thank You!