Rendering Marble

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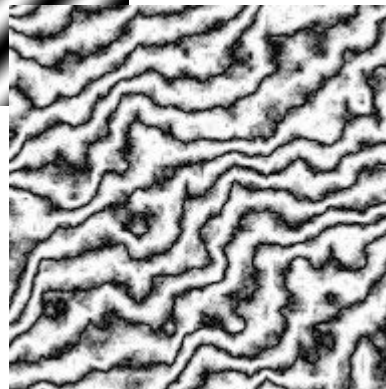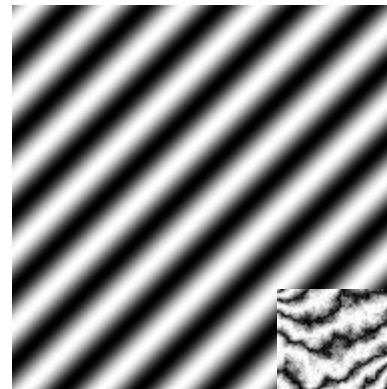
Problem Description

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
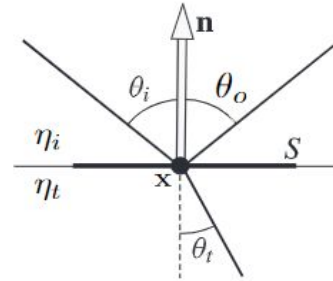- Other options: texture mapping

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

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

Thank You!