Displacement Mapping, Bump Mapping, and Lighting

CS457 Shaders: Project Three

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This project uses per-fragment lighting to create smooth, realistic lighting that follows the curtain's shape and folds. When the vertices of the original flat plane are distorted to create an undulating curtain, and then modified again by perturbing each vertex to create a crinkle texture, the lighting is fixed by adjusting the surface normals at every location to match the surface of the distorted object.

The crinkle effect is created by using bump mapping, which is an efficient way to create realistic texture and surface variants by distorting the normals based on built-in texture values. If you wanted to create the same detailed texture by displacing each individual vertex, you'd need millions of vertices and a lot more space to contain such a huge file, not to mention how long it would take to render! Here are some screenshots of my project on the next page.
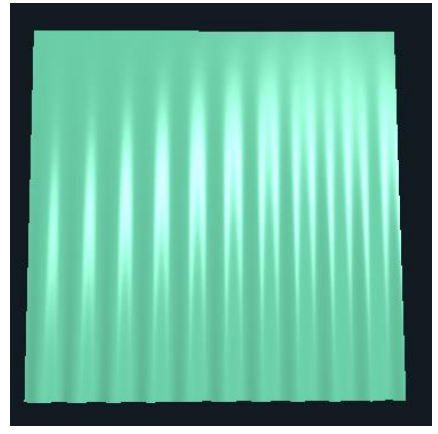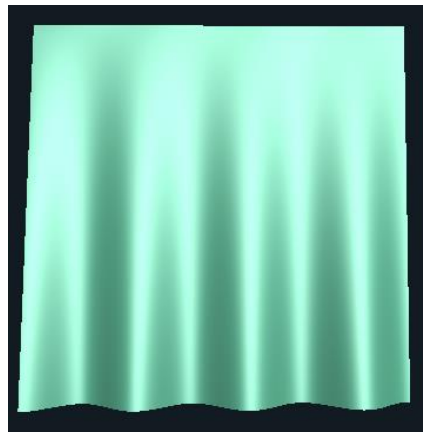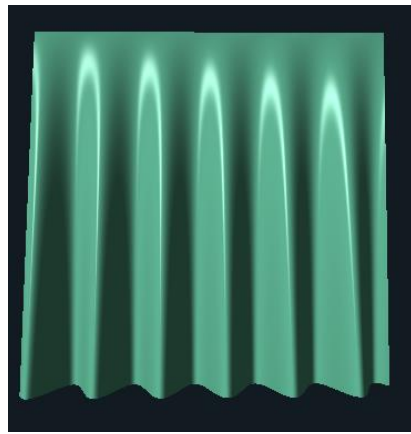
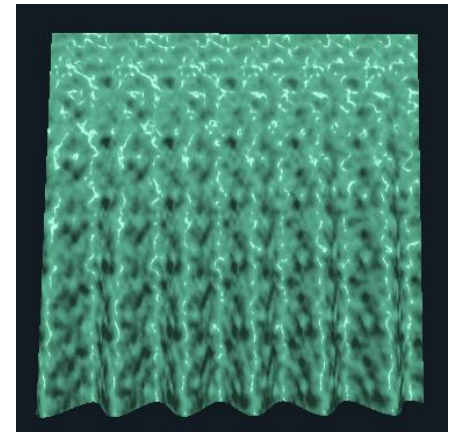Screenshots:
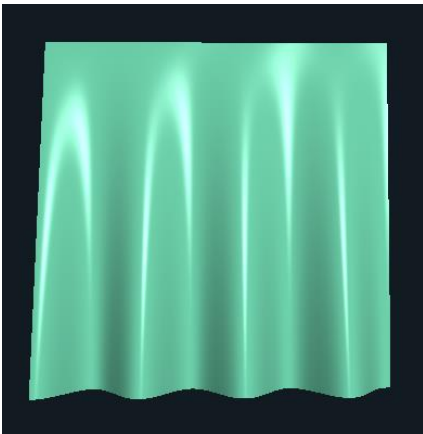
Default Curtain
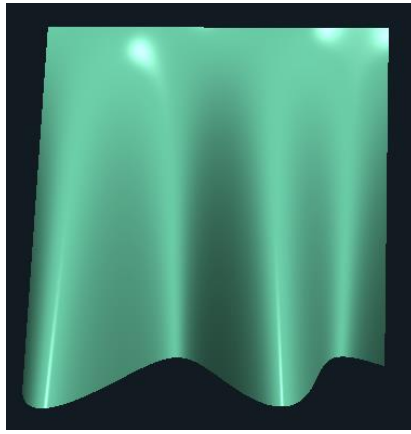
uK high, uP high
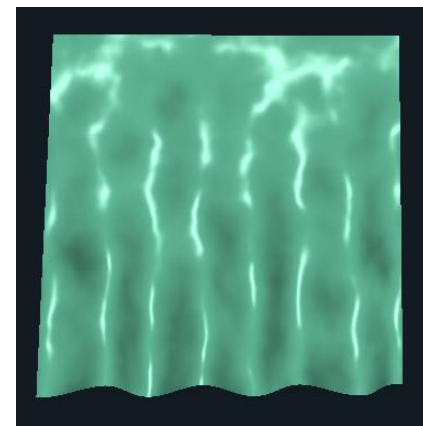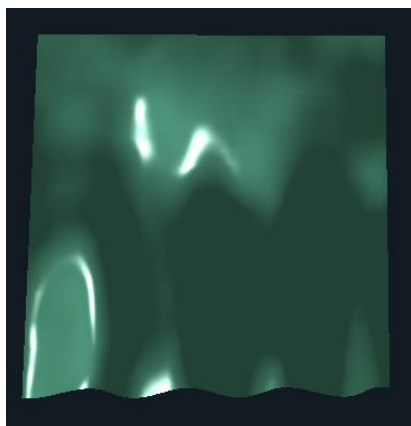
uK low, uP low

Shininess low
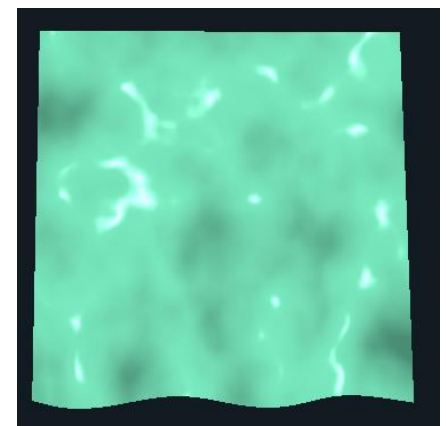
Drama Lighting (from the left)

Noise: high amplitude, high frequency

Noise: low amplitude, low frequency

Fun with sliders!

Attempting to make water…

Video link: https://youtu.be/zUXBBjdBYaU