

MicroSplat

Tessellation and Parallax



Overview

The Tessellation and Parallax module adds support for Tessellation, Parallax Offset, and Parallax Occlusion Mapping (POM), which can greatly enhance the depth effect of a given scene.

Requirements

Tessellation requires shader model 4.6, which means that it works on Windows machines running DX11 or Vulkan, OSX machines running OpenGL or metal, most consoles, and some high end mobile phones.

Shader Features



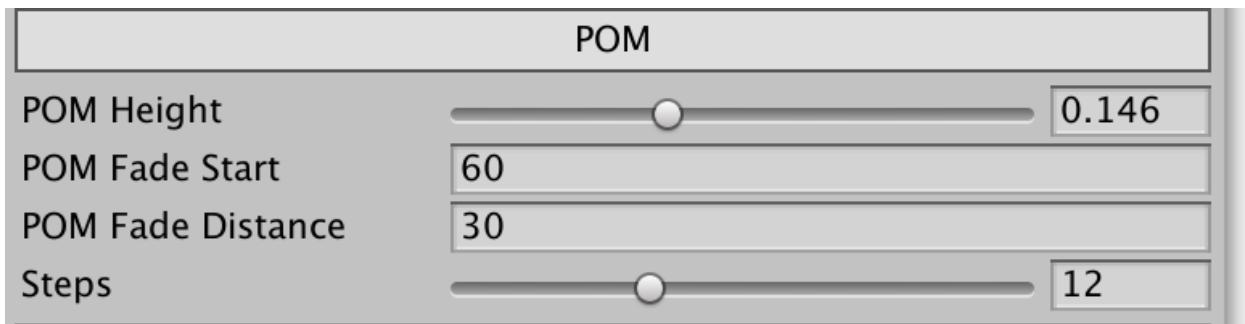
The Tessellation and Parallax options will turn on/off the features. Parallax Offset is a simple technique which adds a greater sense of depth to the surface without actually displacing the geometry, whereas tessellation subdivides and displaces the geometry. The two techniques can be used independently or combined.

Parallax Options

Parallax has but one option, Parallax Height, which controls how much of the effect is applied. If parallax height is too large, the effect may break and look as if the texture is being smeared along the edge of the object.

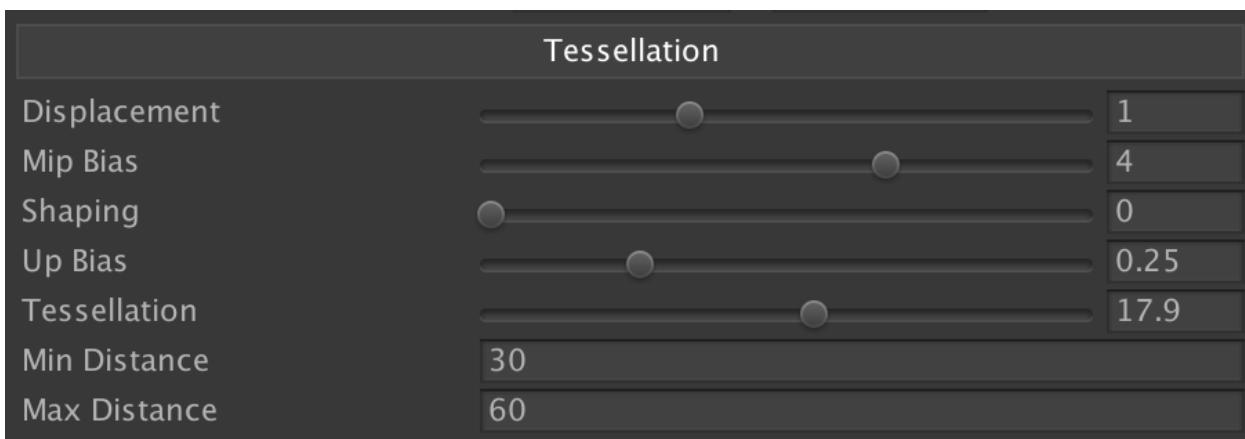
The other Parallax type is Parallax Occlusion Mapping, or POM for short. POM creates a sense of depth by sampling the texture many times along the view direction, until it finds an intersection with the height map. POM can have a number of side effects, but one is that it can have artifacts when working on a curved surface- which most terrains happen to be. This is compensated for in the shader, but if you have particularly large terrain features it can create subtle waves as the camera moves sideways across the terrain. As such, POM works best when using textures that have small details or tile a lot. Note that POM is not compatible with Triplanar texturing.





POM can also be quite costly, as it can take a lot of samples of the textures. To mitigate this, you can control the maximum number of samples taken, and ramp the effect down as it goes into the distance.

Tessellation Parameters



The main shader parameters available for tessellation are described below:

- Displacement
 - How far from the original surface should displacement push the vertices?
- Mip Bias

- How much should we favor a lower mip map in sampling the textures? Higher values generally make performance better and make the displacement smoother.
- Shaping
 - Shaping is a second interpolation contrast used just for Tessellation. Low values will create wide transitions between textures, which tends to look better than sharp transitions.
- Up Bias
 - When Up Bias is set to 0, the displacement happens in the direction of the normal. When Up Bias is set to 1, the displacement happens straight up.
- Tessellation
 - How much to subdivide the triangles. Higher tessellation values look better, but are more expensive
- Min Distance
 - Distance at which to start tessellating and displacing geometry.
- Max Distance
 - Distance at which tessellation and displacement of geometry ends.

Tips and Tricks

1. The quality of these effects is directly proportional to the quality of your height maps. It is thus recommended to supply actual height maps using the PBR mode of the Texture Packer rather than relying on automatically generated ones.
2. The combination of Parallax and Tessellation can be very powerful. With Parallax enabled, you can often use less tessellation and less displacement, but get a similar depth effect on your textures.

3. Per Texture controls are available for several tessellation options. When the "Tess Offset" Per Texture property is enabled, buttons will appear that will allow you to automatically compute the proper offset based on the texture data, allowing the tessellated terrain to stay as close to the original collider as possible.