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Assignment on Advanced Computer Graphics - Sheet 3

Due Date 01.07.2021, 10:00 Uhr

Exercise 1 (Fur Shader, *20 Credits*)

In this assignment, you will implement the shells and fins technique for creating fur, detailed in the lectures on slide 67 and following. For this assignment, we will use SHADERed https://shadered.org/.

The provided project file already includes the textures for the object and the fins. They are bound to the first to samplers in the fragment shader. The fur effect consists of three shaders in the files `furVS.glsl`, `furGS.glsl` and `furPS.glsl`. You will have to work primarily in the geometry shader file.

1. First, you should implement the drawing of the shell. Please use the supplied parameters for shell offsets and alpha values. The triangles need to be extruded by the normals of each vertex, which are stored in the `gs_in[i].normal` and come from the vertex shader. They can be used exactly like for example `gl_in[i].gl_Position`.
2. Next, you need to add the fins at the silhouette of the object. As we do not have adjacency information, we will use a different method from the one shown in the lecture. First, we identify triangles on the edges, which means that one of the normals of the triangle's vertices faces the other direction regarding the viewport as the other two normals. We then find the approximate point on the triangle's edges where the normal flips and extrude this new edge. There are already methods defined in the shader to find that flipping point and create an extruded edge. Your assignment is to find the triangles with flipping edges and create the fins.

Hint: Don't forget that you have to either add the normal to the vertex position either before transformation with `ModelViewProjection` or after transforming both the position and the normal.

Bonus: Currently, if you get close to the object, the fins are shown slightly inside the object. This is due to the projection space and how we test for back- and front-facing normals. Can you think of a way to fix this?

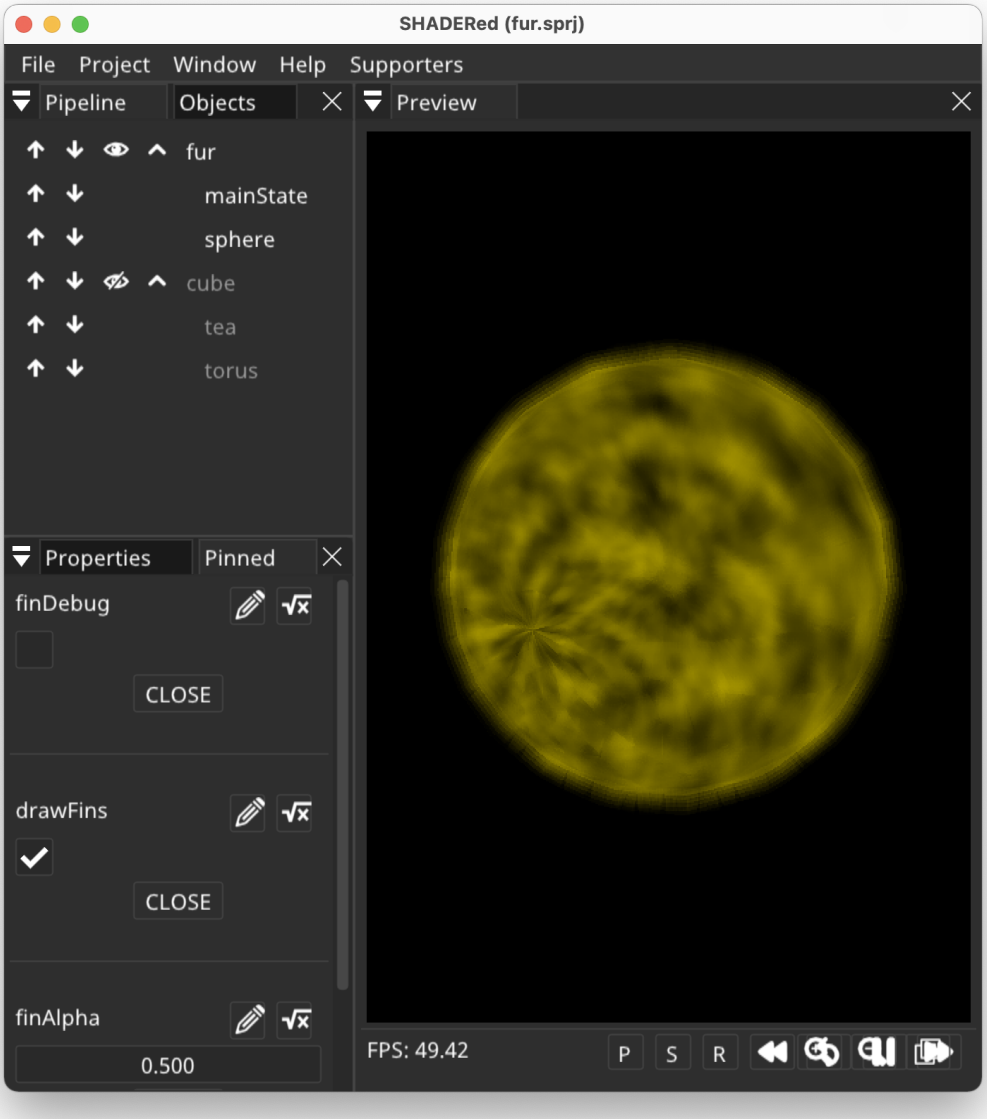

Figure 1: This is how the finished fur shader should look like together with the settings used.