

Computer Graphics - Programming Exercises

Assignment 11 [8 Points] (Real-Time Raytracing - Reflections & Refractions)

In this assignment you will enhance the real-time raytracer from Assignment 10 with refractions. Similar to the previous assignment you only have to edit the fragment shader (rt_fs.glsl).

The main task of this assignment is to produce a nice visual results regarding reflection & refraction. You neither have to exactly reproduce the visual result of the reference solution nor provide a physically correct image. Instead of recursively handling refractions & reflections, as proposed in the lecture, the refractions have to be implemented in a similar fashion as the reflections in Assignment 10.

The scene has been slightly modified: The skeleton provides a new intersection test for a spikeball object and the scene is enclosed in a big sphere. In order to handle the intersection with the spikeball the epsilon correction has been slightly changed. Keep in mind that you have to take care of the direction in which you apply the epsilon correction (Hint: refraction/total internal reflection, hitpoint inside/outside).

As in Assignment 10 - there are additional instructions inside the source-code. You should also have a look at the references mentioned in the source-code. The raytracing shader can be reloaded at runtime by pressing 'n'. Tasks:

- a) Refracted ray direction
Modify the loop for the refraction computation accordingly to the instructions in the code.
- b) Total internal reflections (TIRs)
Implement handling for TIRs in the refraction loop. The new test object causes TIRs with the given refraction indices.
- c) Fresnel equation
Handle reflections and refractions to produce a better visual result. You have to calculate the reflectance/transmittance accordingly to the resources referenced in the source-code. Implement and use the transmittance function.
- d) Beer-Lambert law
Apply the Beer-Lambert law to your refraction color computation to simulate absorption.
- e) Bonus (10 Extra Points)
Impress us! You could e.g. implement a caustics effect or other primitive intersection tests.

Good Luck!

Your source code will be copied from your handin directory on:

Monday, 02.02.2015 14:00 pm

all subsequent changes cannot be taken into account!