EURECOM
Sophia Antipolis

Final report

TP 1 : Blender

*3*DGraph

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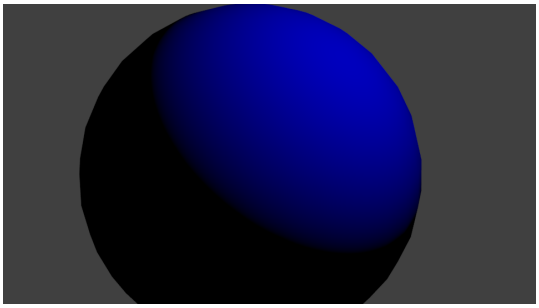
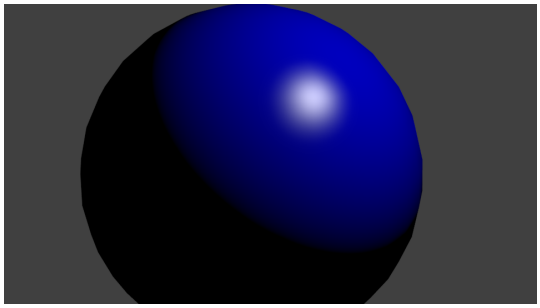
Sommaire

1. Question 1 : First experiments, objects, materials, shading

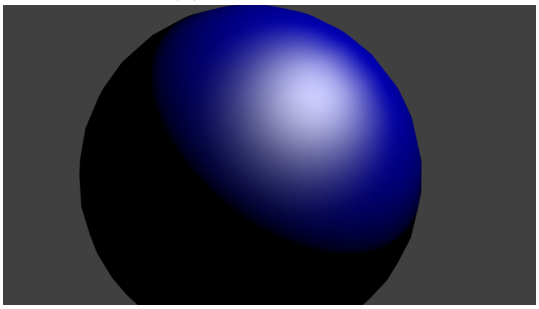
Here is our reproduction of the images shown on the subject :



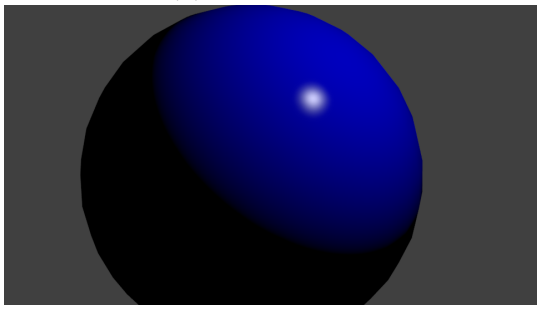
(a) `Ks=0.0, Ns=100`



(b) `Ks=0.5, Ns=100`



(c) `Ks=1.0, Ns=15`



(d) `Ks=1.0, Ns=511`

Our spheres have been obtained with those following values for the specular intensity and hardness :

Picture	Specular intensity	Hardness
1 (top left)	0.0	50
2 (top right)	0.5	100
3 (bottom left)	1.0	15
4 (bottom right)	1.0	511

2. Question 2 : Create a scene, reflection, refraction, cast shadows

The values we choose are consistent with was we see :

- There is nothing to say about the blue sphere, everything has been explained in the first part.

- For the transparent sphere (on the right), we fix the value of alpha at 0.300, which gives the a lot of transparency of the object (the sphere is totally transparent if alpha = 0). Moreover, putting IOR (Index Of Refraction) at 1.31, is the IOR of glass. This value allows to refract a part of the rays that travel through the sphere, which explains that the ground is distorted (according to the Law of Reflection). When moving IOR to 1.00 (IOR of the air), any rays are refracted, thus the ground behind is not distorted.

- For the mirror sphere (on the left), we put the reflectivity to 0.85. A perfect mirror has a reflectivity of 1.00, and reflect all the rays that arrive at the surface of the sphere. In our case, a big majority is reflected.

We can see that there are some problems about the cast shadows. In fact, there are two types of shadow : the lighter one is quite realistic, but the other one is totally dark, which is never the case in real life. Moreover, we can see that the boundary between the those two shadows is very sharp, there is no penumbra.
To cope with these non-realistic issues, we should add an *ambiant light* that would allow to have a natural lightening.

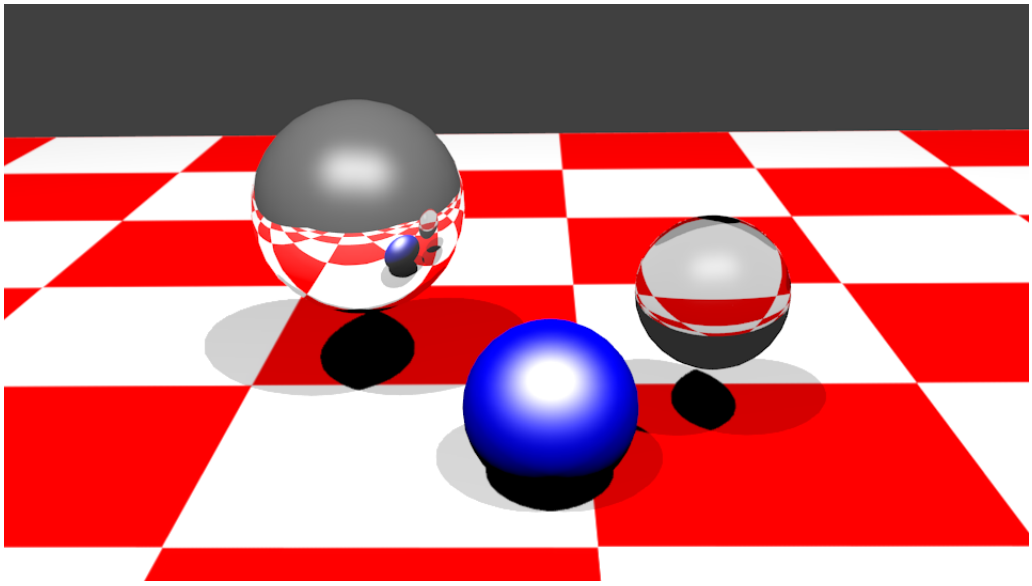


Figure 2: Reproduction of the three spheres

3. Question 3 : Playing with textures, bumping, transparencies

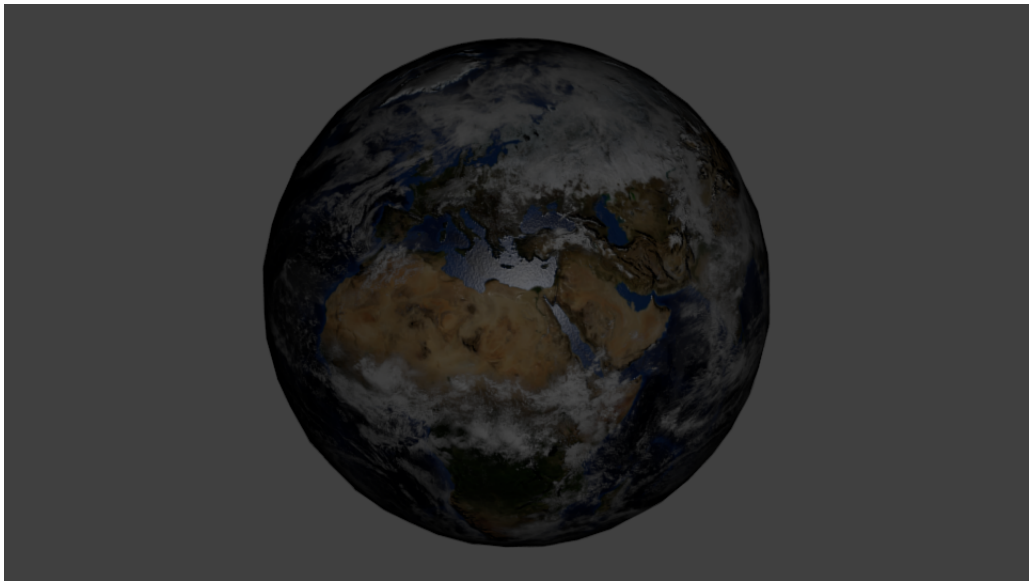


Figure 3: Our reproduction of the earth

We used several concepts to apply different textures to our object (the earth) :

- The first texture we used is a ***bump texture***, that consists in applying an image to our object (a sphere here) to give an illusion of relief. By using this method, we disturb the surface geometry by modifying the value of the normal N. This method works very well here, as we have the impression there is the relief created by the mountains.

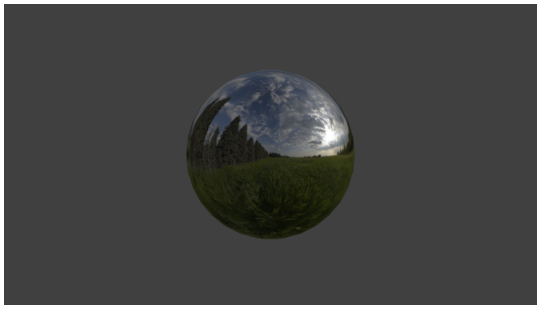
- We then applied a *color mapping*, which consists in adding a ***material texture***. It modifies the value of Kd (that mean the color) of the earth to give color to the ground and the see.

- A ***specular map*** is then applied to bring high light and shining at some places. In our case, this map allows to make the ocean shiny (with specularity, Ks = 1) and the continents diffused (Ks = 0).

- Finally, ***transparency textures*** were added when we applied the *transparency map* to model the clouds. By doing that, the image we added to recover the earth was transparent, except from the clouds that were white.

4. Question 4 : More textures, environment mapping and chrome effect

(a) `q4-1.blend`



(b) `q4-2.blend`

(c) `q4-3.blend`

(d) `q4-4.blend`

During the two last step, the texture is wrapping the sphere 1, for which the texture coordinates are set to reflection. The texture is inside the sphere 2, for which the texture coordinates are set to generated.

It would be possible to validate the reflection effect by choosing a directional light (spot light) instead of the sphere emitting its own light. This light would be reflected only on the part of the sphere facing the light.

5. Question 5 : Animation, path, focus, chrome effect

The chrome surface shines differently with the viewer movement. Only the faces of the object which are almost parallel to the view shine, just like a mirror would do.

Indeed, a point on this chromed object would reflect the light by following a path orthogonal to its face. The viewer would only receive this light if this path through to him, ie. when he is parallel to this face.