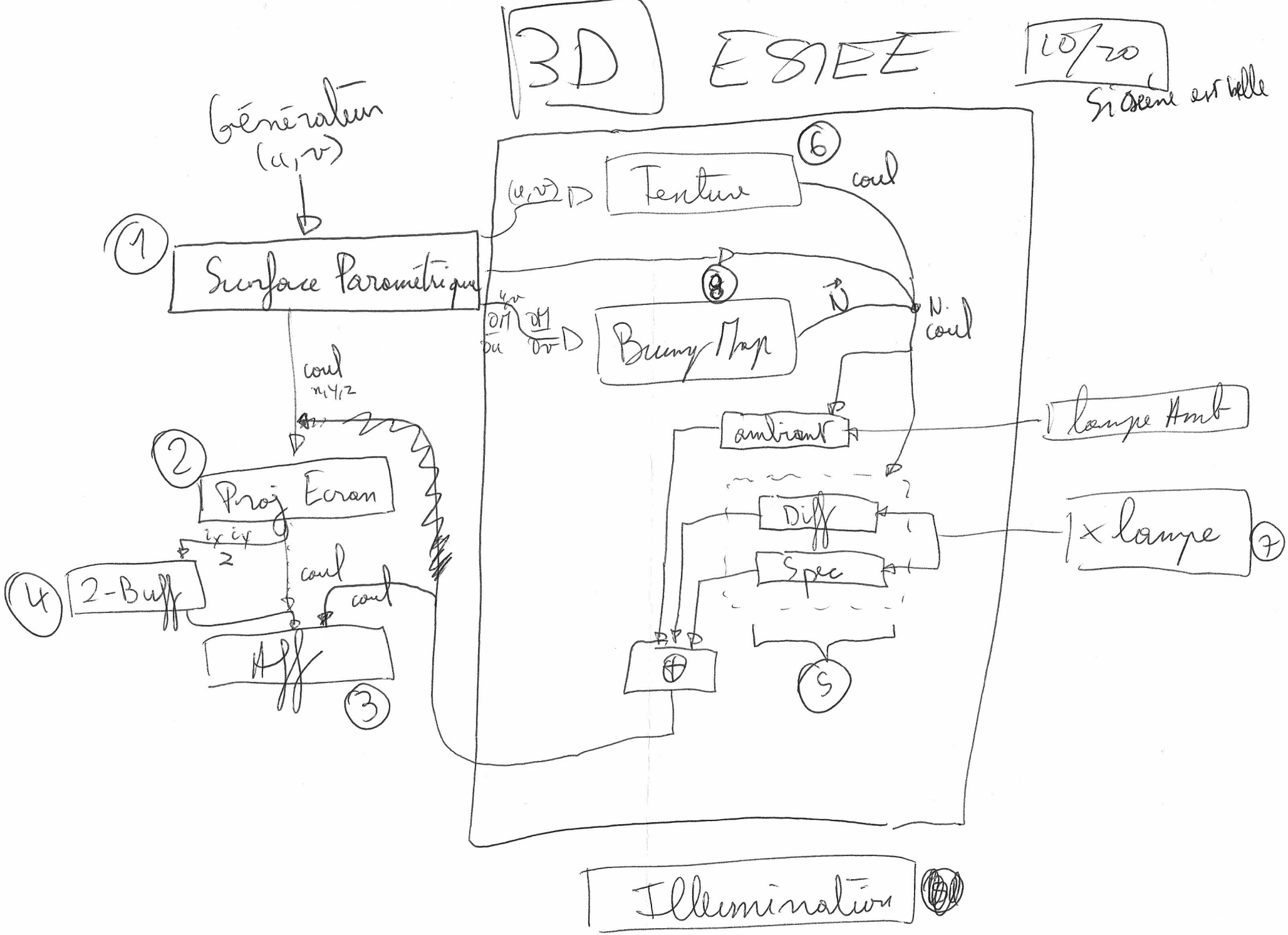
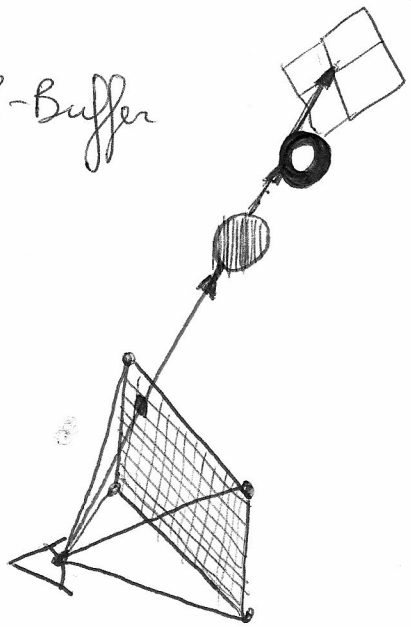
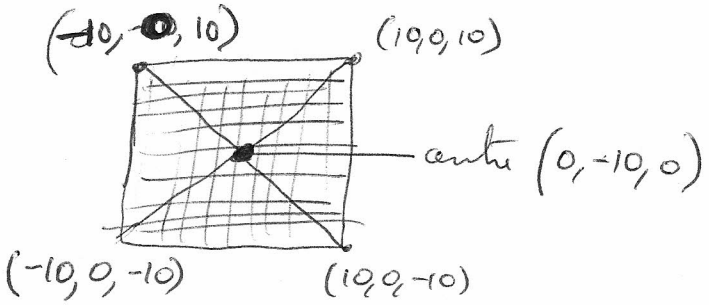

3D ESIEE
10/20
Si osons est belle
Générateur (u,v)
1
Surface Paramétrique
(u,v)
6
Texture
coul
8
Bump Map
N
N. coul
coul n,1/2
2
Proj Ecran
ix iy z
4
2-Buff
coul
coul
Aff
3
ambiant
lampe Amb
Diff
Spec
x lampe
7
5
Illumination

Ray Casting

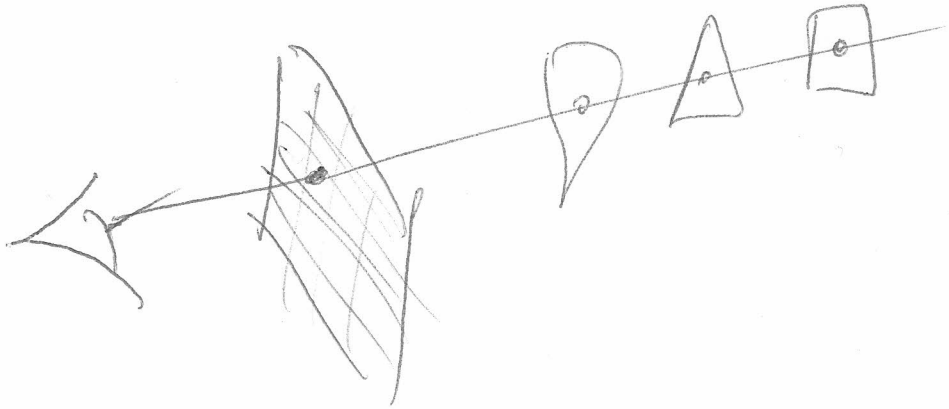
≠ Z-Buffer

castle Wolfenstein






```
for (float i = -L ; i <= L ; i += 2L/800)
for (float j = -H ; j <= H ; j += 2H/600)
{
    R = P3(0,-10,0)
    Rd = (i, 0, j);
    Rd.normalize();
    ------>
}
```



Calcul d'intersection Rayon / Sphère

Rayon : $R(t) = R_0 + t\vec{Rd}$ $\quad t > 0$

Sphère : Centre : $C(x, y, z)$ rayon r

les ∩ Rayons / sphère vérifie : $(R_0 + t\vec{Rd} - C)^2 = r^2$

↳ equ de la forme $At^2 + Bt + C = 0$

$B' = B/2$

$\Delta' = B'^2 - AC$

$t_1 = \frac{-B' - \sqrt{\Delta'}}{A}$

$\Delta = B^2 - 4AC$

$t_1 = \frac{-B - \sqrt{B^2 - 4AC}}{2A}$ $\qquad t_2 = \frac{-B + \sqrt{B^2 - 4AC}}{2A}$

on sait $t_1 < t_2$

3 cas
- $t_1 > 0 \Rightarrow R(t_1)$ est l'∩ + proche
- $t_1 < 0, t_2 > 0 \Rightarrow R(t_2)$ est devant la caméra
- $t_1, t_2 < 0 \Rightarrow \cap \varnothing$

---

4 étapes

→ calcul Δ $\xrightarrow{<0}$ pas d'∩

→ calcul t_1, t_2

→ calcul ∩

→ inversion coord sphérique → u & v

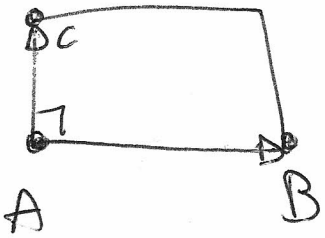
Mieux Programmer

2 fcts

① IsIntersect() → calcul Δ pas cher

② FindUV() → tout le reste

n rayon - rectangle



Rayon : $R_0 + t\vec{R_d}$

$\in$ Plan : $A + \alpha\vec{AB} + \beta\vec{AC}$

Calcul de t

$$R_0 + t\vec{R_d} = A + \alpha\vec{AB} + \beta\vec{AC}$$

$$n = \frac{\vec{AB} \wedge \vec{AC}}{\| \quad \|}$$

$$R_0 \cdot \vec{n} + t\vec{R_d} \cdot \vec{n} = A \cdot \vec{n}$$

$$t = \frac{\vec{R_0A} \cdot \vec{n}}{\vec{R_d} \cdot \vec{n}}$$

$= 0$ qd?

cond $t > 0{,}001$

Calcul inter

$$I = R_0 + t\vec{R_d}$$

Calcul α

$$A + \alpha\vec{AB} + \beta\vec{AC} = I$$

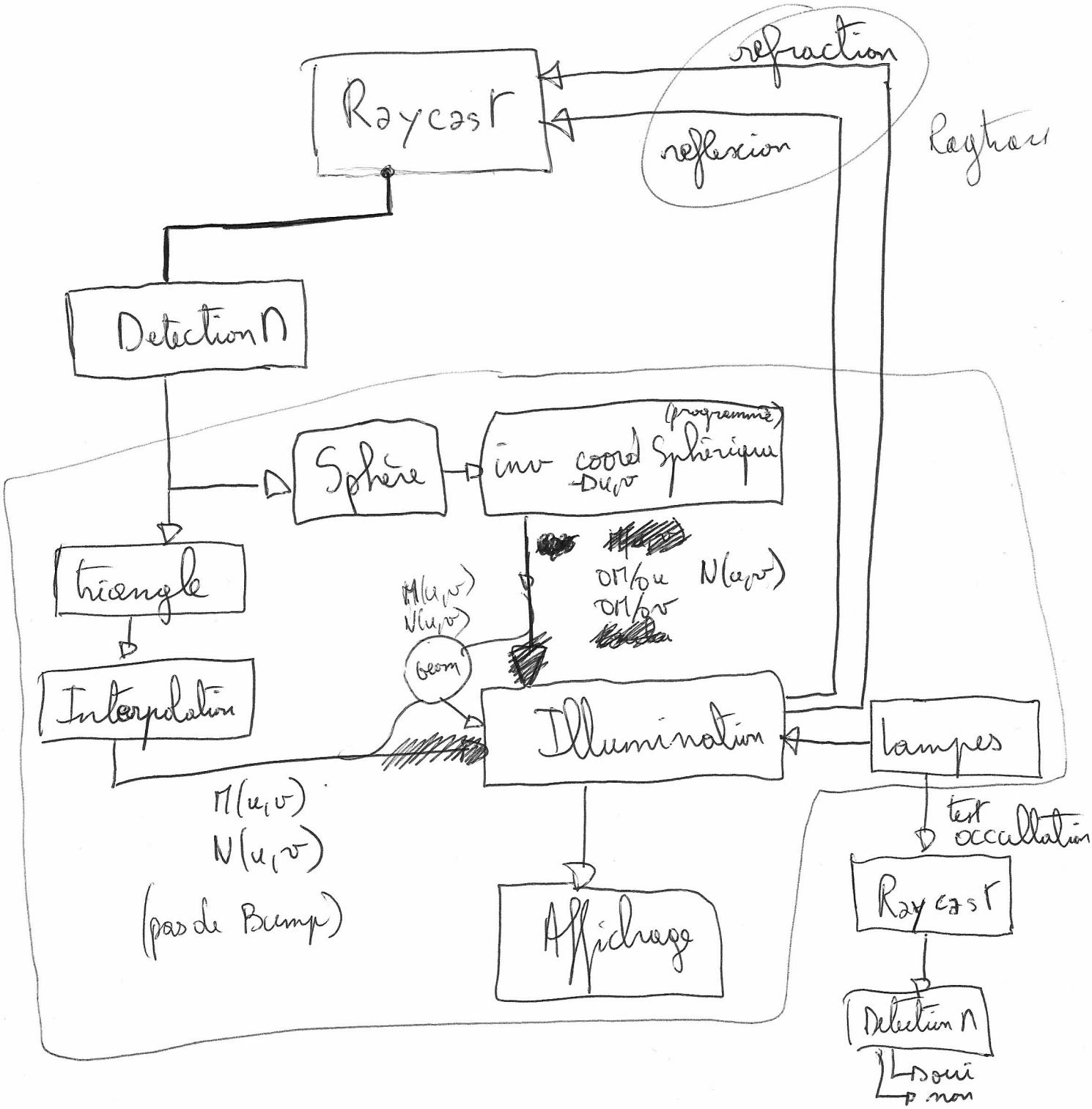
$$\alpha\vec{AB} + \beta\vec{AC} = \vec{AI}$$

$\vec{AB} \cdot \vec{AC} = 0$

$$\alpha\,\vec{AB} \cdot \vec{AB} = \vec{AI} \cdot \vec{AB}$$

$$\alpha = \frac{\vec{AI} \cdot \vec{AB}}{\vec{AB} \cdot \vec{AB}}$$ const / const

β idem


Raycast
refraction
reflexion
Raytracer
Detection
Sphère
inv coord Sphériques
(programmé)
triangle
Interpolation
M(u,v)
N(u,v)
dM/du
dM/dv
N(u,v)
Beam
Illumination
lampes
M(u,v)
N(u,v)
(pas de Bump)
Affichage
test occultation
Raycast
Detection
oui
non