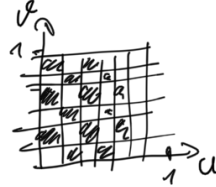


Procedural texture:

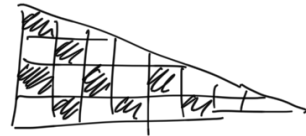
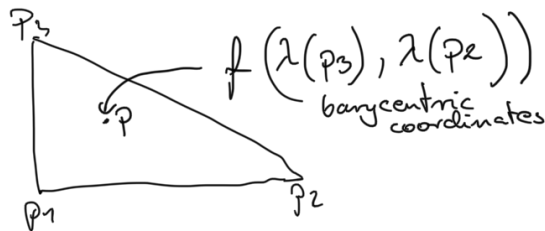
$$f: \mathbb{R}^2 \rightarrow \mathbb{R}^3 \quad [0,1]^2 \rightarrow \text{color}$$

For example:

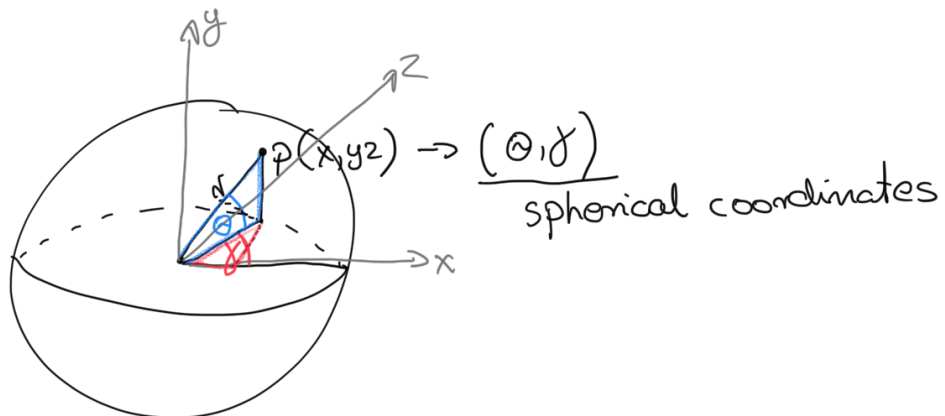
$$f(u,v) = (\lfloor mv \rfloor + \lfloor nu \rfloor) \% 2$$



Texturing triangle:



Texturing sphere:



We need to transform the position  $p = (x,y,z)$   
to spherical coordinates  $(\theta, r)$ .



$$\frac{y}{r} = \sin \theta \rightarrow \theta = \arcsin\left(\frac{y}{r}\right) \in \left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$$



$$\frac{z}{x} = \tan \phi \rightarrow \phi = \arctan\left(\frac{z}{x}\right)$$

↓

$$\phi = \operatorname{atan2}(z, x), \text{ to get the correct signed angle}$$

$$\phi \in [-\pi, \pi]$$

To apply texture  $f(u, v)$  to the sphere,

we have to compute  $u, v \in [0, 1]$

Let then :

$$u = \frac{\phi + \pi}{2\pi} \quad \text{and} \quad v = \frac{\theta + \frac{\pi}{2}}{\pi}$$