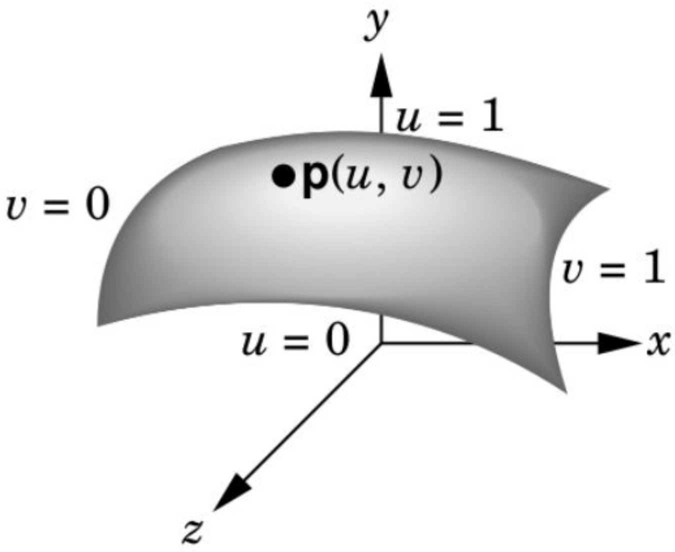
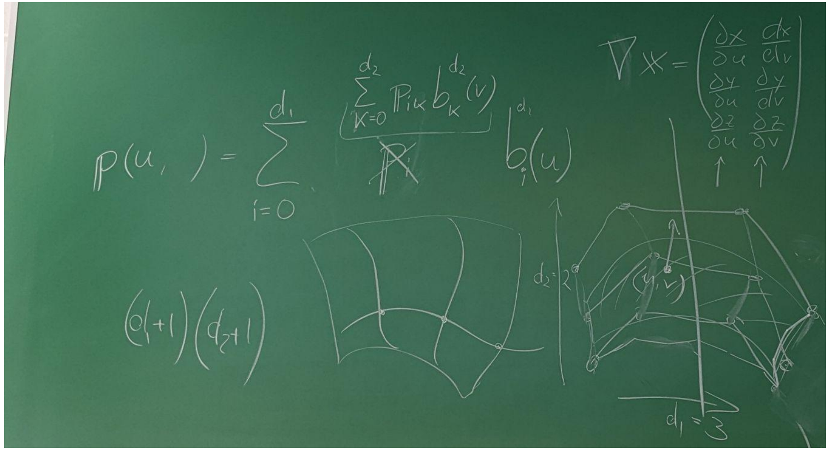
Curved Geometry in 2 variables

Tensor-product BB-form:

$$p(u,v) = \sum_{i+j=d_1} \sum_{k+l=d_2} \mathbf{p}(i,k) B_{j,i}(u) B_{k,l}(v)$$

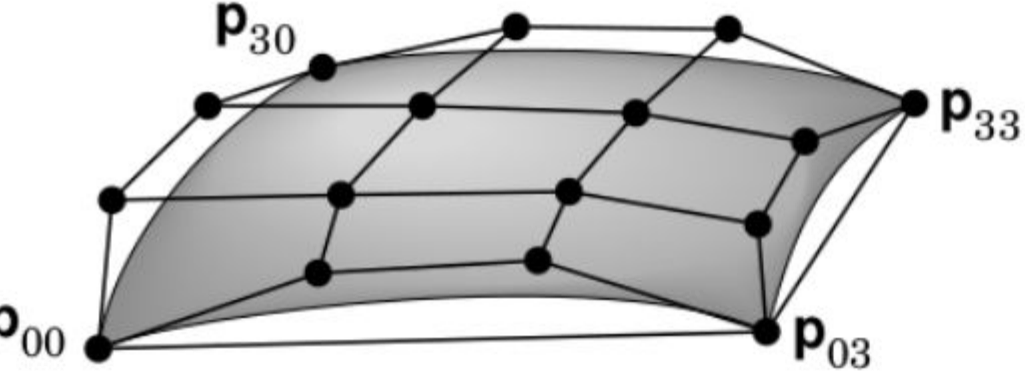


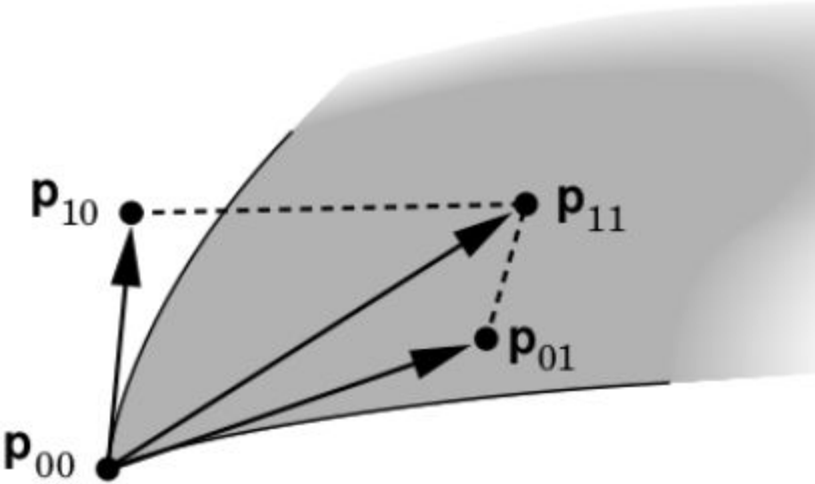


Curved Geometry in 2 variables

Tensor-product BB-form:

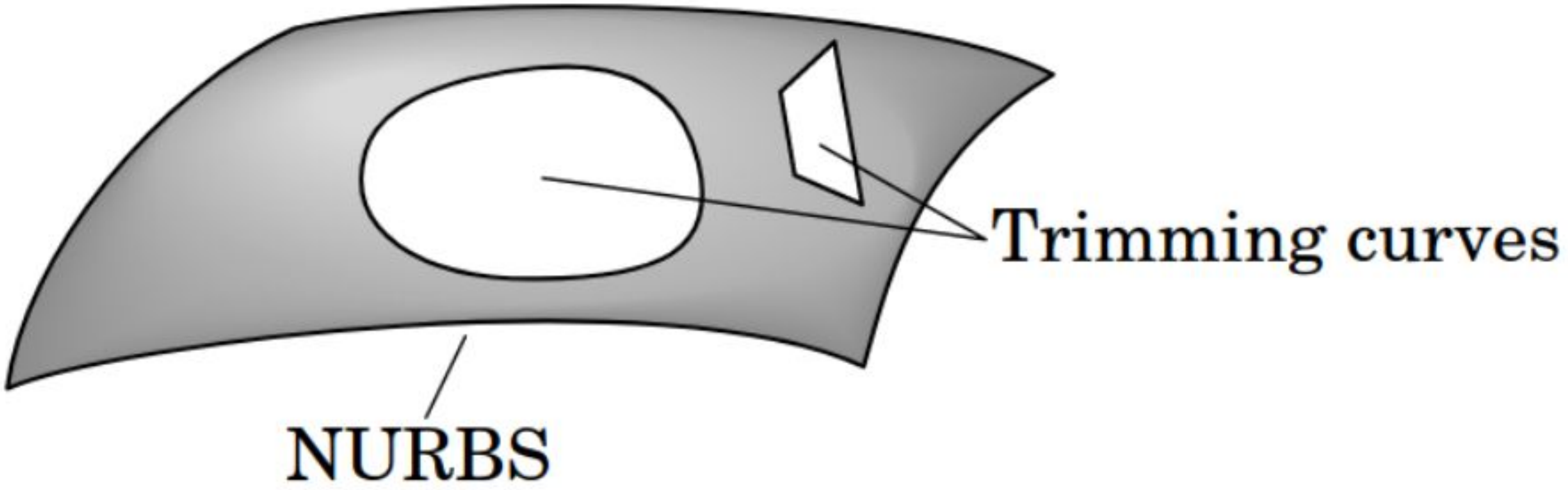
$$p(u,v) = \sum_{i+j=d_1} \sum_{k+l=d_2} \mathbf{p}(i,k) B_{j,i}(u) B_{k,l}(v)$$





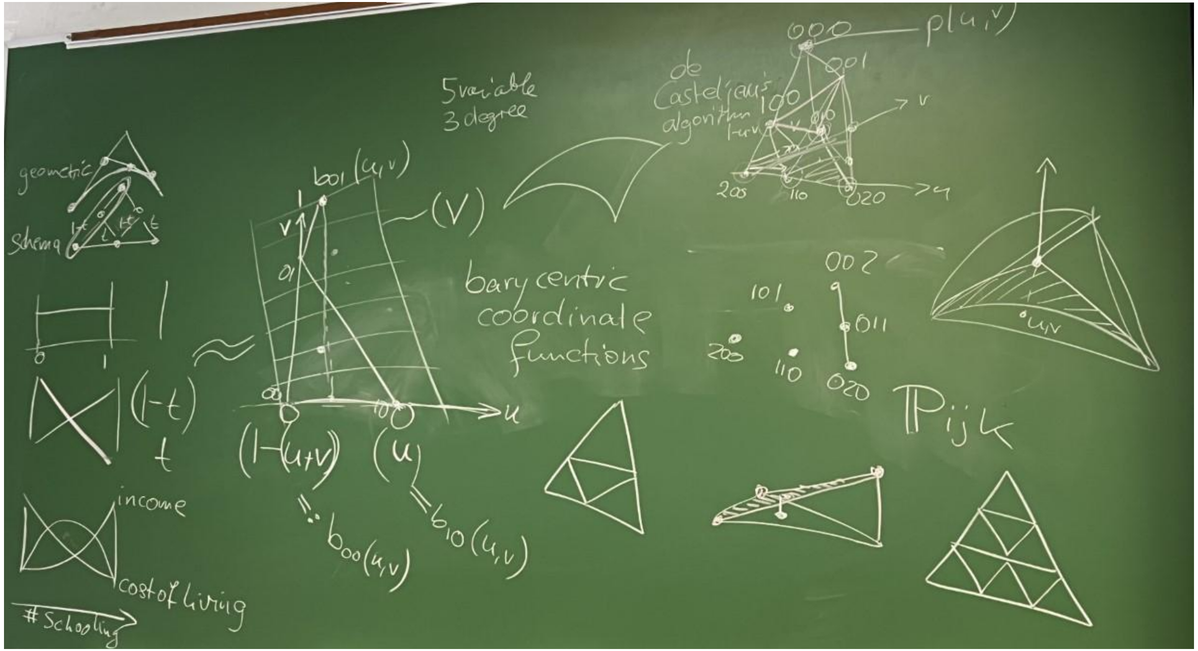
Curved Geometry in 2 variables

NURBS



Curved Geometry in 2 variables

$$p = \sum_{i+j+k=d} c(i,j,k) B_{i,j,k} \qquad B_{i,j,k}(u,v,w) = \frac{d!}{i!j!k!} u^i v^j w^k, \qquad u+v+w=1$$



Curved Geometry in 2 variables

$$p = \sum_{i+j+k=d} c(i,j,k) B_{i,j,k},$$

$$B_{i,j,k}(u,v,w) = \frac{d!}{i!j!k!} u^i v^j w^k, \qquad u + v + w = 1$$

for $l = 1..d$

. for $i + j + k = d - l$

. $c(i,j,k) = u \cdot c(i+1,j,k) + v \cdot c(i,j+1,k) + w \cdot c(i,j,k+1)$

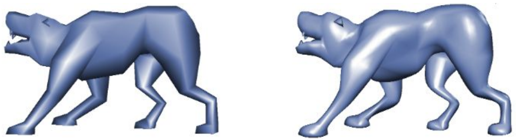
$$n = (c(0,1,0) - c(1,0,0)) \times (c(0,0,1) - c(1,0,0))$$

return($puvw = c(0,0,0), normal = n/\|n\|$)

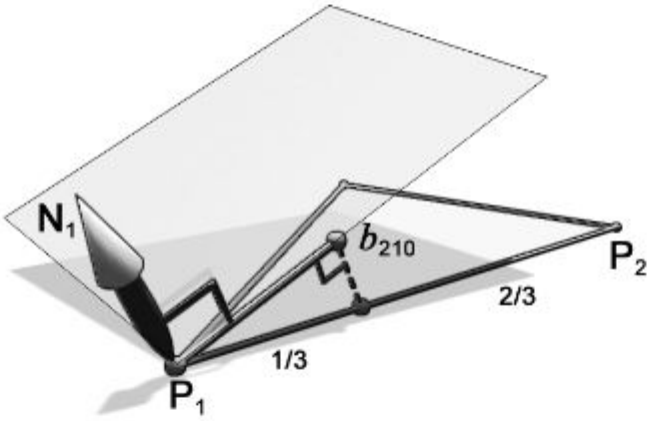
Curved Geometry in 2 variables

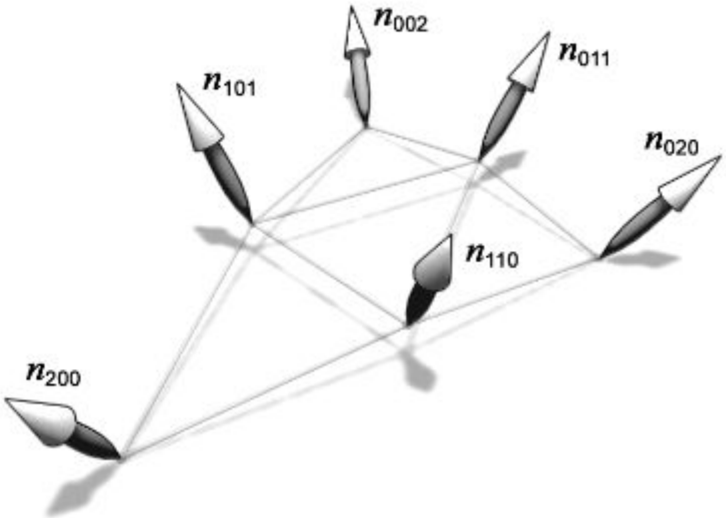
[Curved PN triangles]

Curved Geometry in 2 variables



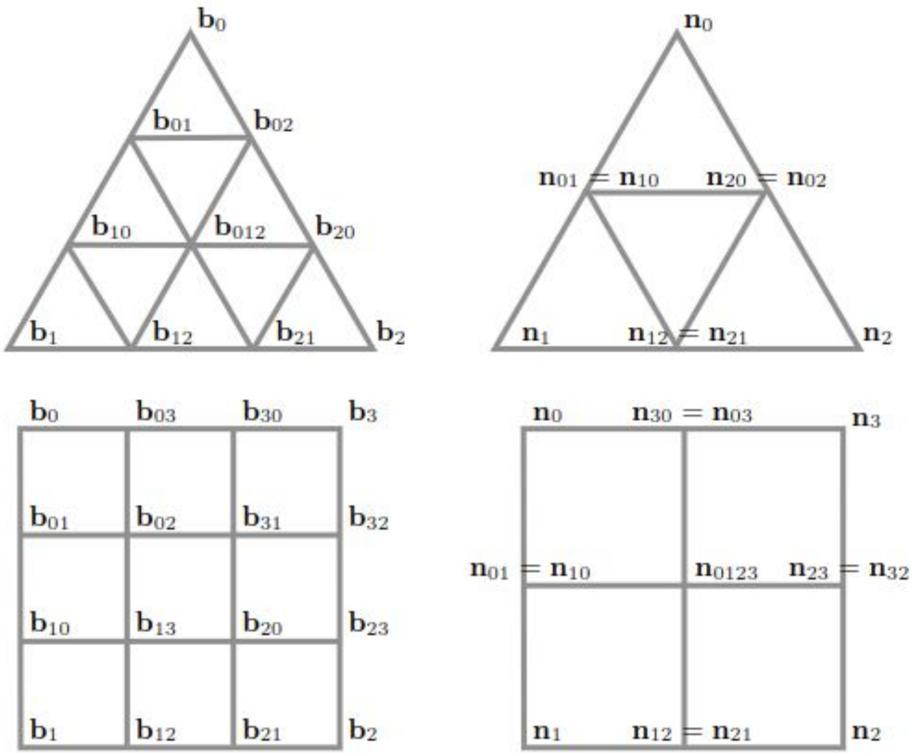
[Curved PN triangles]



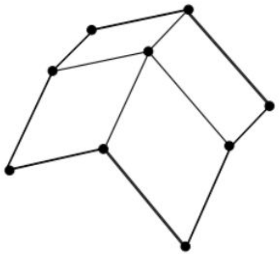


Curved Geometry in 2 variables

[Curved PN quads]

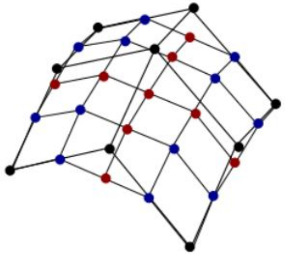


Curved Geometry in 2 variables



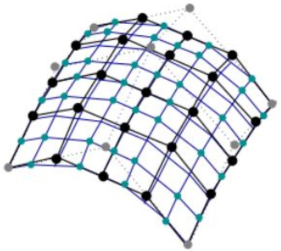
Subdivision begins with a few points connected to form faces

- These are the initial control points used to define the surface



At each step new points are created determined by the surrounding points.

- Original control points
- de Casteljau in front-to-back direction
- Second de Casteljau application



Iteration of de Casteljau=Subdivision

- Input control points
- First Iteration
- Second Iteration