

Modeling with Maya

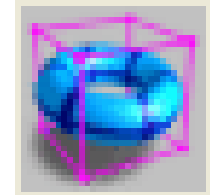
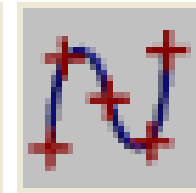
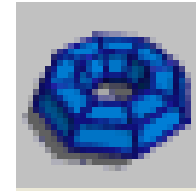
2010-2011

lionel.reveret@inria.fr

estelle.duveau@inria.fr

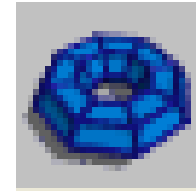
Maya modeling

- Polygons
- NURBS curve and surface
- Subdivision surface

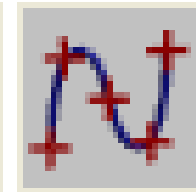


Maya modeling

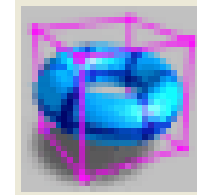
- Polygons



- NURBS curve and surface



- Subdivision surface



+ Texture mapping



Polygons

- 😊 intuitive
- 😊 mathematically simple
 - a set of 3D points and a list of connections (faces)
- 😊 direct from 3D scanner
- 😞 local transformation only
 - tedious editing
- 😞 complex link with texture
 - require projection schemes from 3D to 2D

Polygons tools with Maya

- Base shape creation
 - cube, torus, etc. => see menu “Create>Polygon primitives”
- Translate, rotate, scale components
 - vertices, edges, faces, UV (!), vertex-face (!)
- Edit Polygons
 - subdivide or split tool
 - extrude (vertex, edge, face) => try tool parameters
- More :
 - smooth, reduce (Polygons menu),
 - bevel, chamfer
 - etc

Texturing polygons

- UV editing, “Window>UV texture editor”
 - choose an image
 - texture is related to a material (2D or 3D)
 - texture coordinates are related to a mesh (placement)
 - try on a cube
 - UV are moved, rotated or scaled in 2D
 - try on a cone (checker/cyl) or a sphere (image/planar)
 - base projection is proposed
 - other projections are possible (Polygon UVs>mappings), update using UV sets (RMB) and UV linking...

NURBS

- 😊 smooth by definition
- 😊 direct link with texture mapping (2D/2D)
- 😐 mathematically well-defined but not intuitive
 - polynomial curves $\mathbf{C}(u) = \sum_i P_i(u) \mathbf{P}_i$,
 - bi-polynomial surface $\mathbf{S}(u,v) = \sum_{ij} P_i(u) Q_j(v) \mathbf{P}_{ij}$

=> set of points and polynomial interpolators
- 😞 Quite difficult to manipulate

NURBS tools with Maya

- Base shape creation
 - curves et surfaces => see menu “create>NURBS primitives”
- Using components
 - curve: control vertex, hull, edit point
 - surface: control vertex, hull
 - components can be inserted
 - Insert Knot curve, and Insert Isoparms for curve
 - display various level of interpolation (‘1’, ‘2’, ‘3’ keys) for interactive view
- More complex tools
 - Revolve a curve
 - Loft two curves
 - Cut and Sew patches
 - etc

Texturing NURBS surface

- Surface $S(u,v) == \text{Image } I(u,v)$
- compare poly sphere and nurbs sphere
 - use checker texture and move vertex/CP

Subdivision surface

- ☺ Smooth subdivision of ANY control polygon
- ☺ No polynomial interpolation
- ☺ Good rendering properties (aliasing)
- ☹ No clear mapping between 3D surface and 2D texture

Painting

- Select object and RMB > Paint
 - Sculpt :
 - a brush to modify 3D shape
 - Paint 3D :
 - a brush to modify 2D texture

Scene hierarchy

- Objects positioned with respect to each other
 - wheels w.r.t cars, cars w.r.t roads, etc
- Representation :
 - internal: 4x4 matrices
 - user: xyz vectors and Euler angles
 - pivots can be edited ('insert' key)
 - move/rotate can be local or global
 - see Node **transform** help reference
- Base command : Edit>parent