

Geri, Subdivided



NURBS for n00bs

- Problems with NURBS:
 - Trimming is difficult and expensive
 - Limited topologies (sheet, cylinder, or torus)
 - Smoothness hard to guarantee (Example: Woody)



Geriatric Modeling

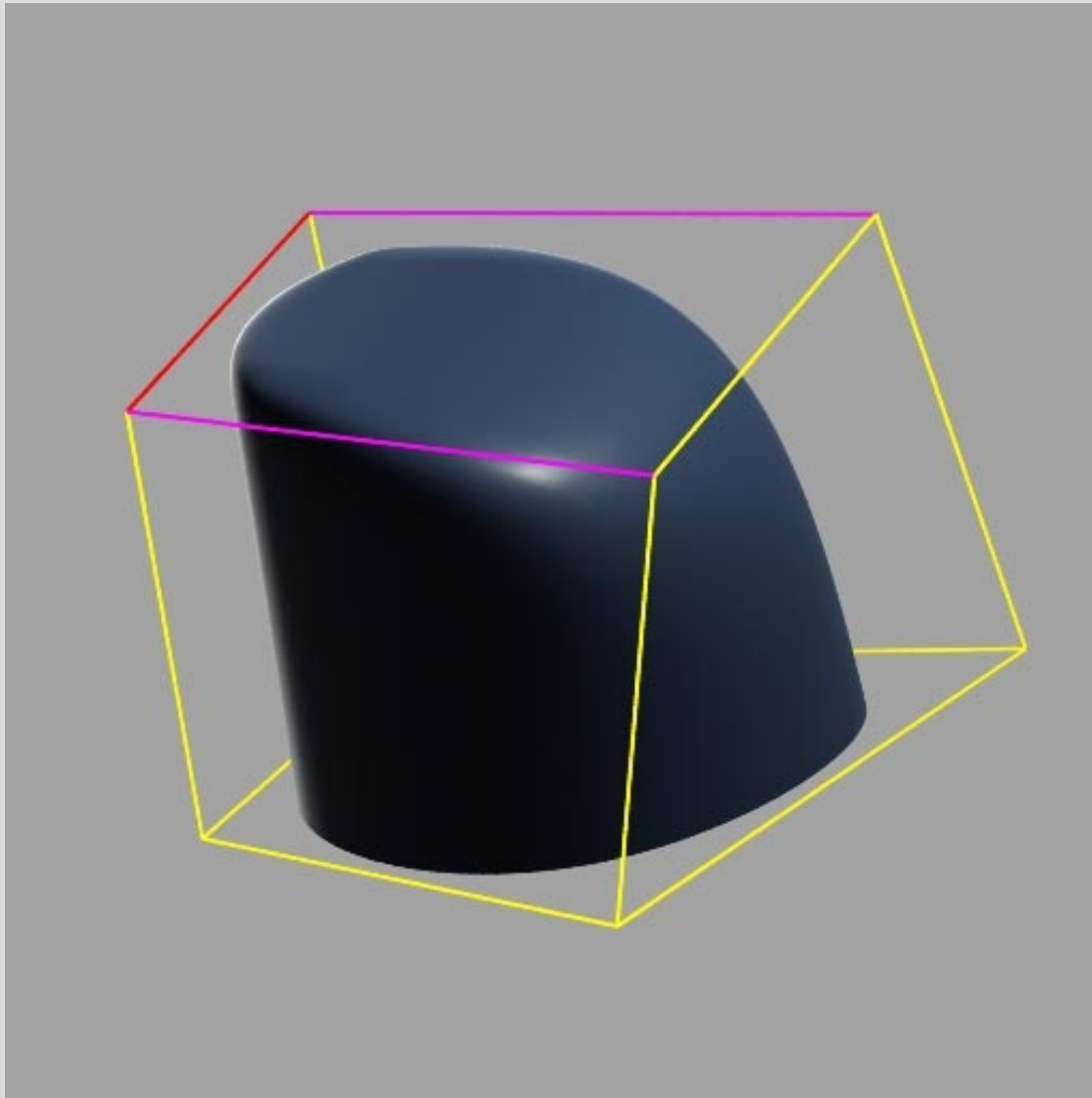
- Assigning sharpness value to edges:



Hybrid Theory

- Using hybrid subdivision, possible to make edges sharp when viewed far away but smoother up close, much like real objects.
- Example of sharpness in subdivision rules found in Figures 7 and 8

Variable Sharpness



- Red edge:
Sharpness = 4
- Magenta
edges:
Sharpness = 2

Dynamic Cloth (The Cool Part)

- Mass-Spring Model
 - Stiff along edges: prevents fabric stretching
 - Flexible along diagonals of quadrilaterals: allows for skewing, simulating wrinkling and flowing



ENERGY
FUNCTIONAL:

Insert ugly
math stuff
here.



Collision Detection

- Quad tree built from surface mesh.
 - Pick epsilon (ϵ)
 - Move down the quadtree from the root, testing each bounding box to see if it's within epsilon of the test surface.
 - If it is, then continue down that node's subtree.
- Coarsening hierarchies for obstacles

Renderin'



- Scalar fields...kind of unsure about this part.
- Check paper for more pictures.

Discussion Stuffs

- Question 1 -
 - The paper uses colors and a bounding box to control sharpness on corners. Is this the most popular method for 3D programs at this point, Maya, 3DS Max etc?

This approach seems a bit tricky for editing large meshes; is there a way in Maya to connect multiple "control edges" to adjust sharpness around a crease that spans multiple polygons? Perhaps using "shift+click"?

Discussion Stuffs

- Question 2 -
 - This paper is similar to the previous one in that it uses subdivision surfaces to create smooth or sharp features. However, doing so requires any "surface roughness" to be painted on with a texture. Couldn't we add some noise to each vertex as it is subdivided at each level (dividing the noise amplitude as we go) to add a fractal texture to the subdivision surface instead of simply producing smooth surfaces?
 - I would think that as the subdivision progresses you'd end up with a sand-papery result. While this may be what you're looking for, cloth for example is rough but does not have that much chaos.

Discussion Stuffs 2.5

- Question 3 -
 - The hybrid approach seems to be a novel idea. But, in case 1 describing the 'sharp rules', how can we set a limit to the sharpness beyond which we apply the same rules as the infinitely sharp edge rules?

Case 2 seems very obvious but again a good idea. Can any one explain to me what exactly are warping and wefting?

More Fun Discussion Stuffs

- Question 4 -
 - How can you “unsubdivide” a surface?
- Question 5 -
 - What structures do you think they used for this method? Could something similar to the HalfEdge be used? Or do you all think the structure they chose was probably much more expansive?
 - It is hard to say whether a halfedge data structure is enough or not because running time is always a tradeoff with memory consumption. Just like the collision part in the paper, they used the hierarchical data structure to accelerate the collision detection.

More?

- Thank you :)