

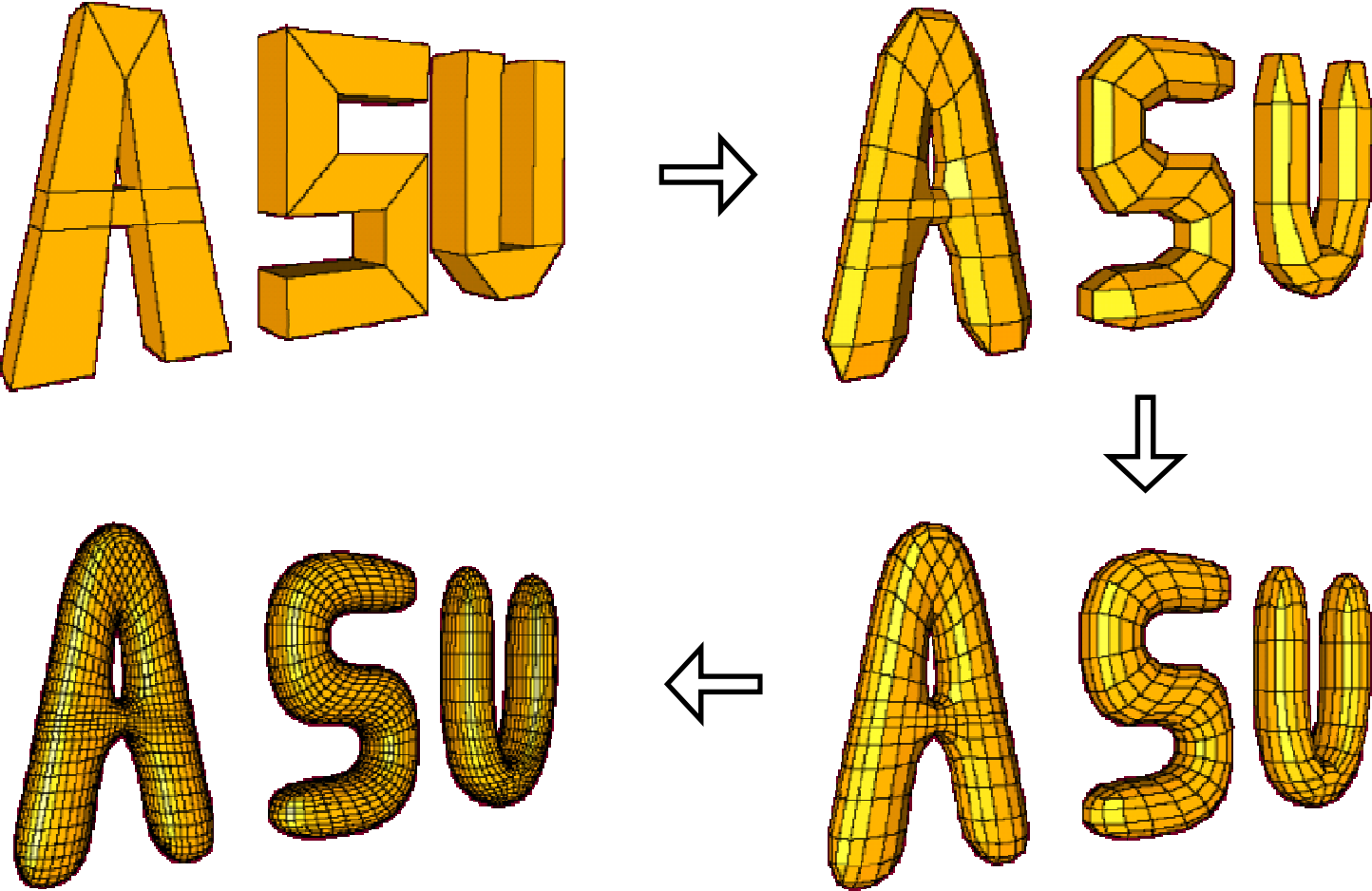


Subdivision surfaces

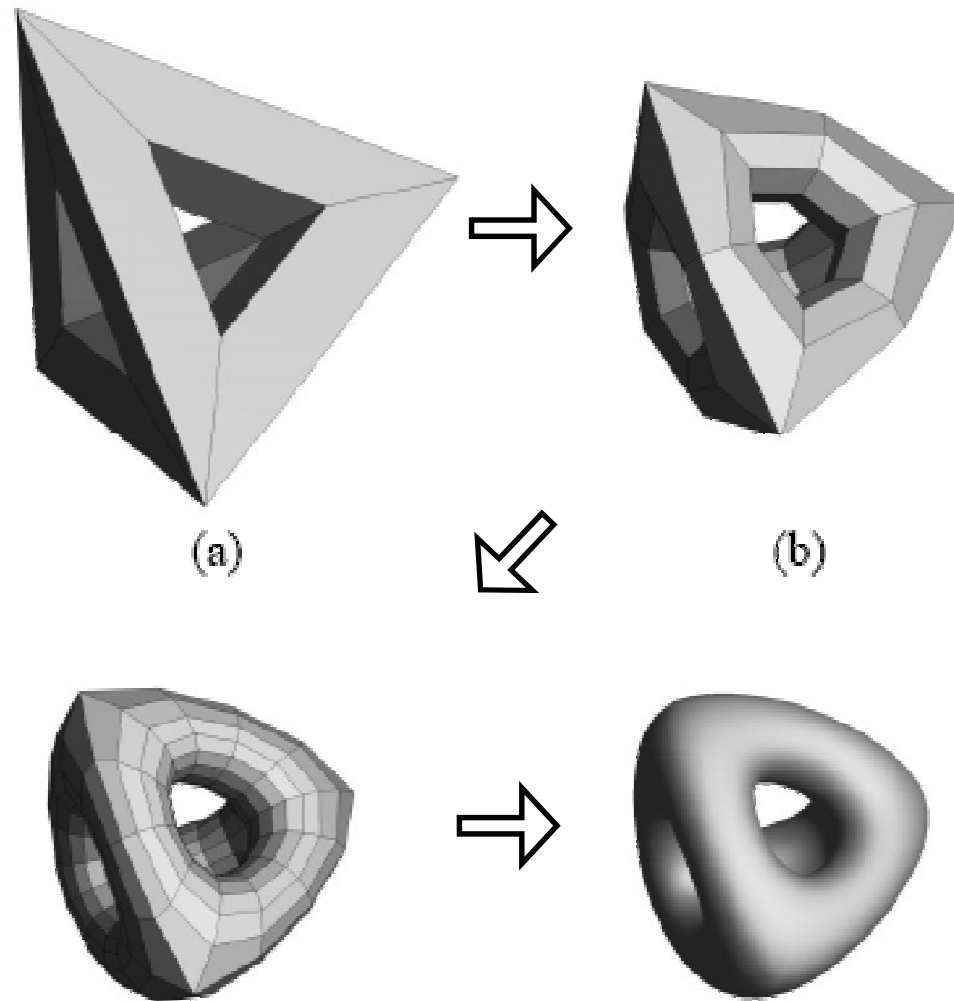
Carlos Andújar

October 2011

Introduction

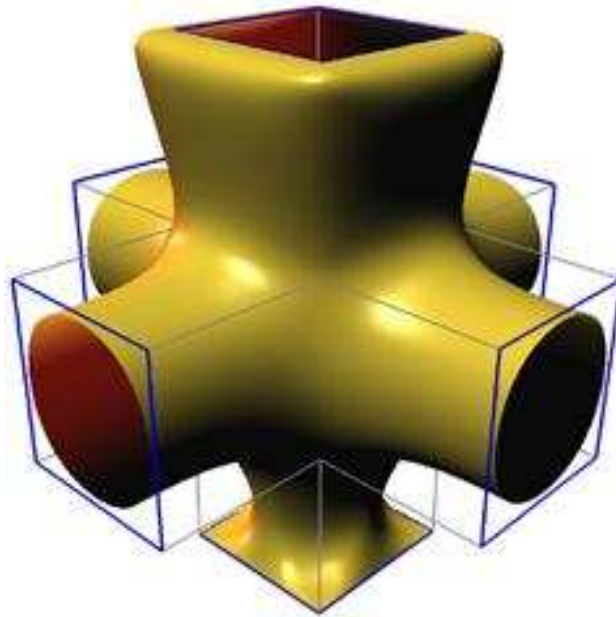


Introduction

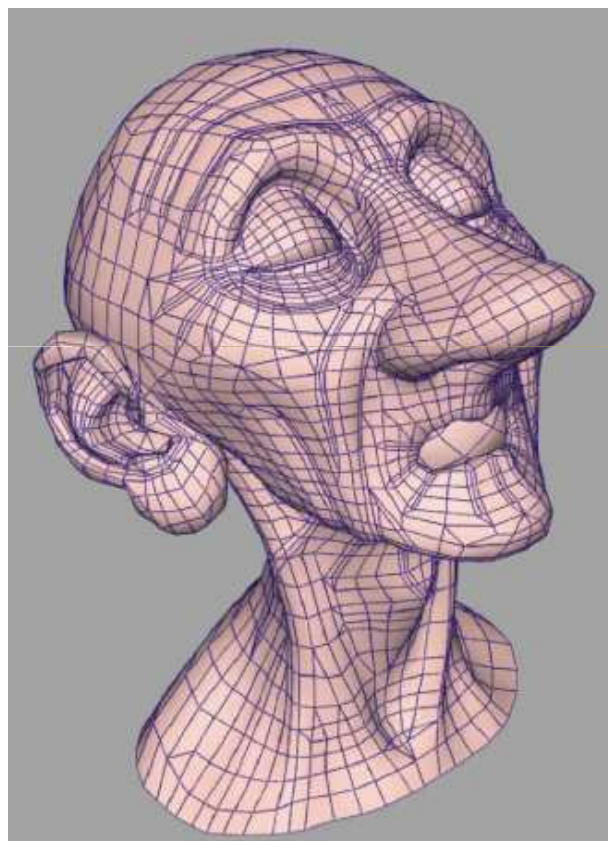




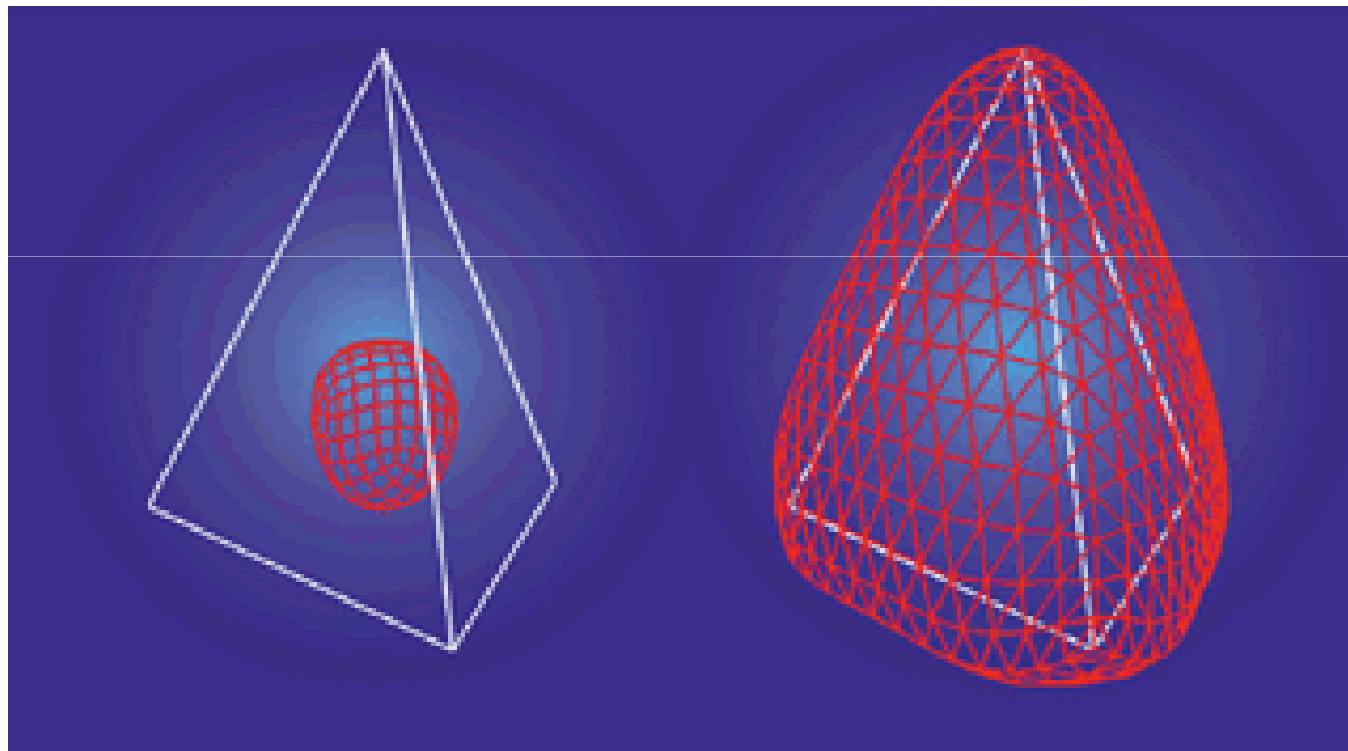
Applications



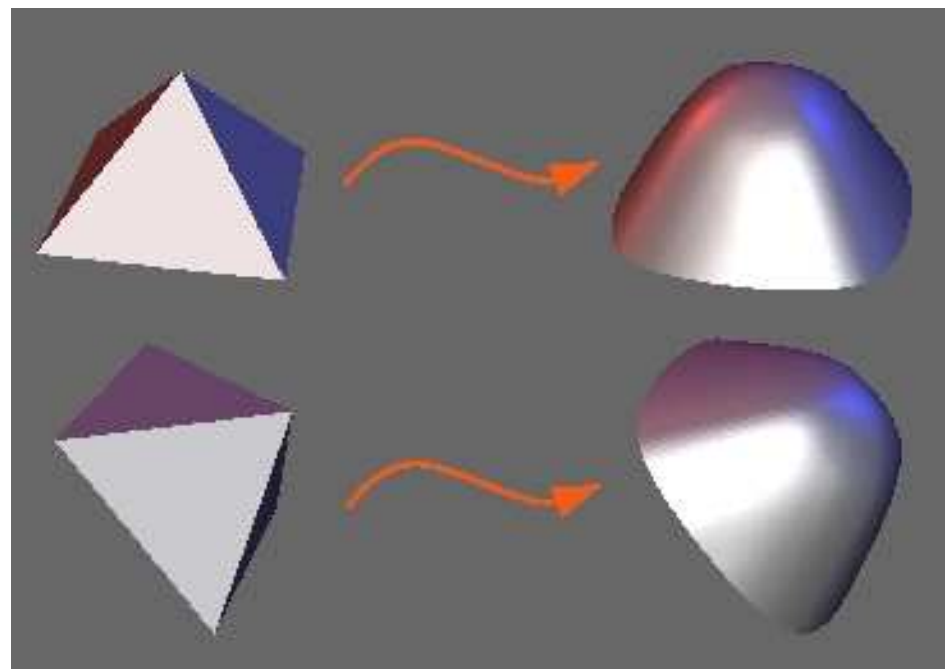
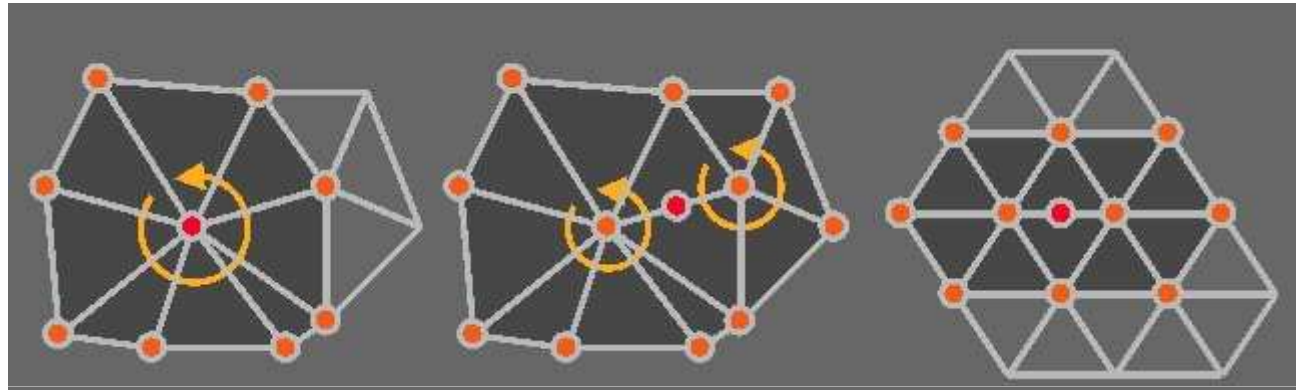
Applications

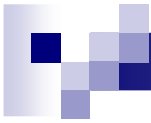


Approximation vs. Interpolation

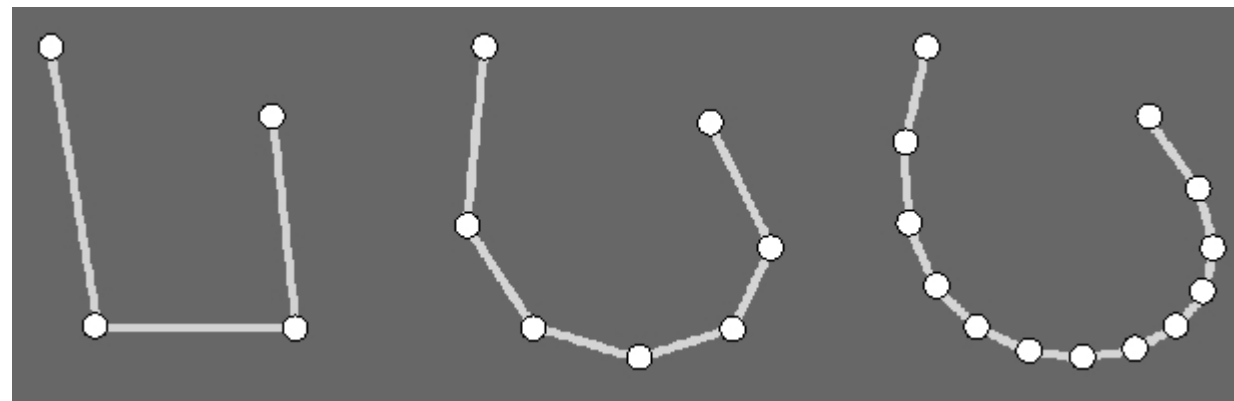
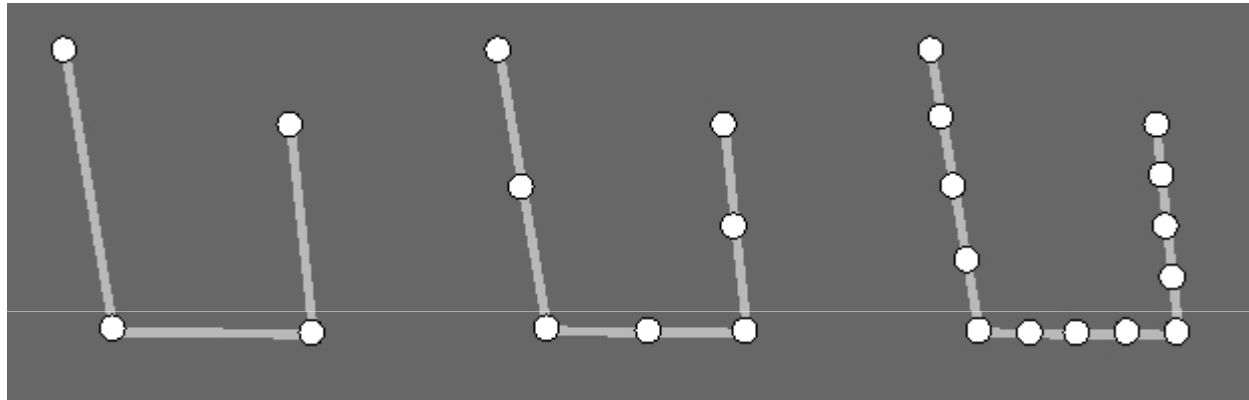


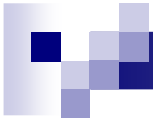
Nice properties



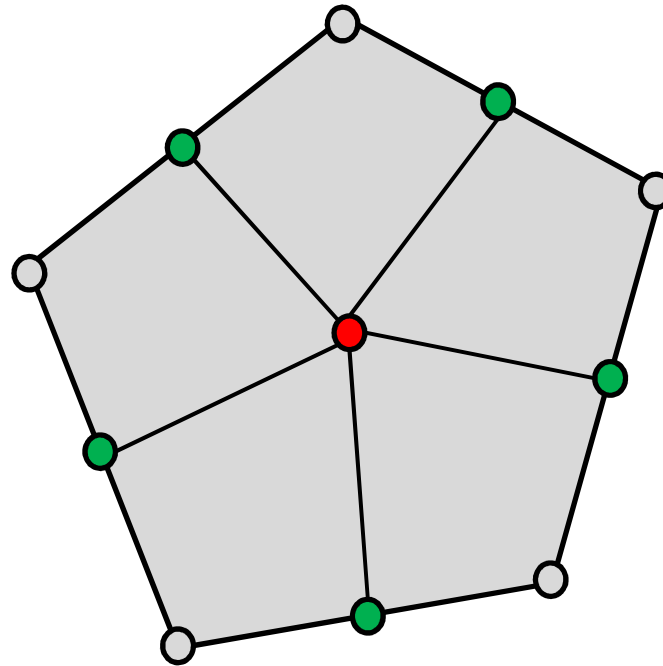
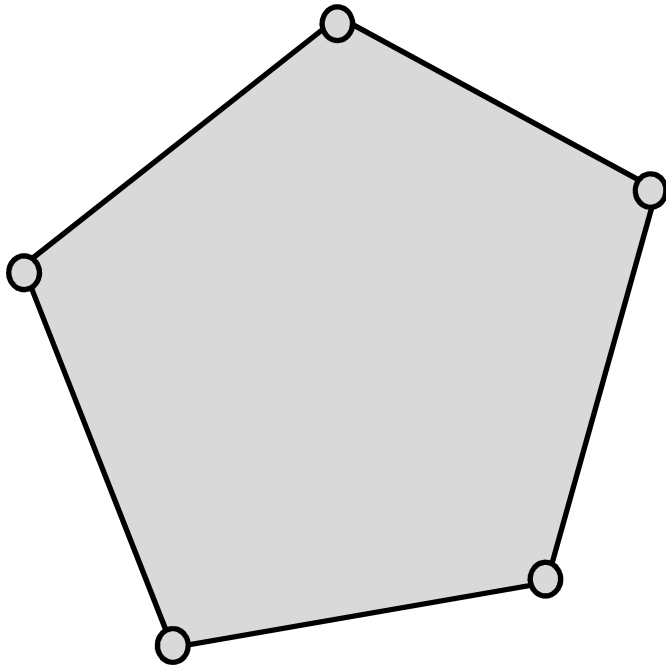


Curve subdivision





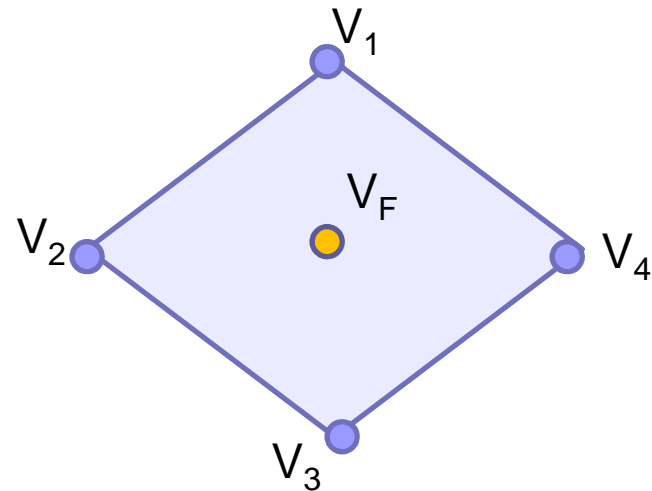
Catmull-Clark



Catmull-Clark Geometry

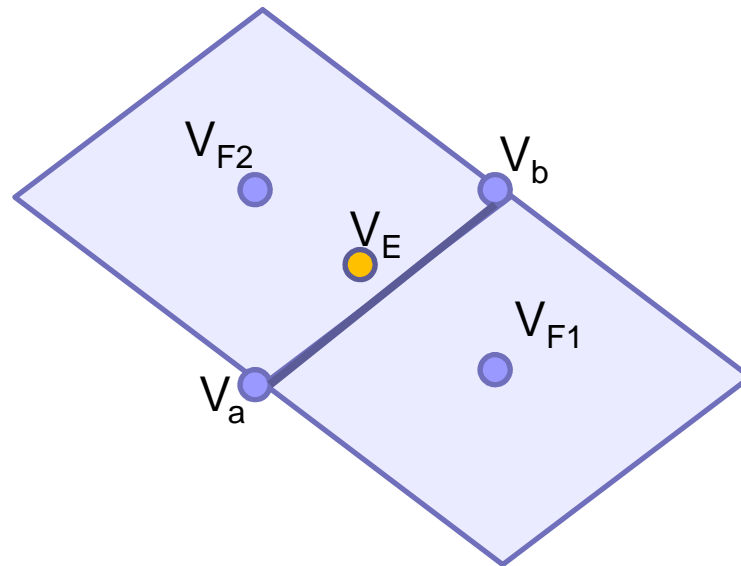
V_F = centroid of the vertices of the face

$$V_F = (V_1 + V_2 + \dots + V_n) / m$$



Catmull-Clark Geometry

$$V_E = (V_a + V_b + V_{F1} + V_{F2}) / 4$$



Catmull-Clark Geometry

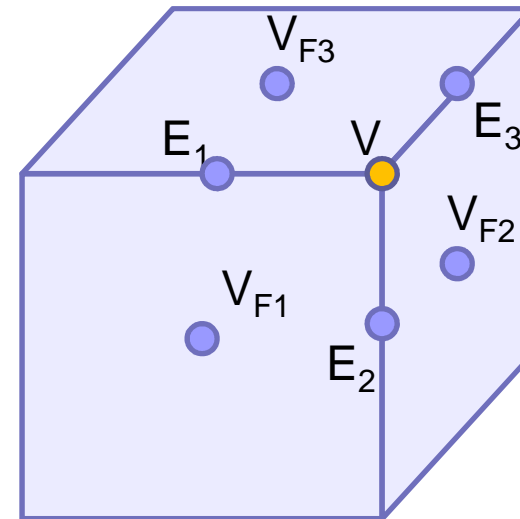
$$V_V = (F + 2R + (n-3)V) / n$$

F = centroid of the V_F

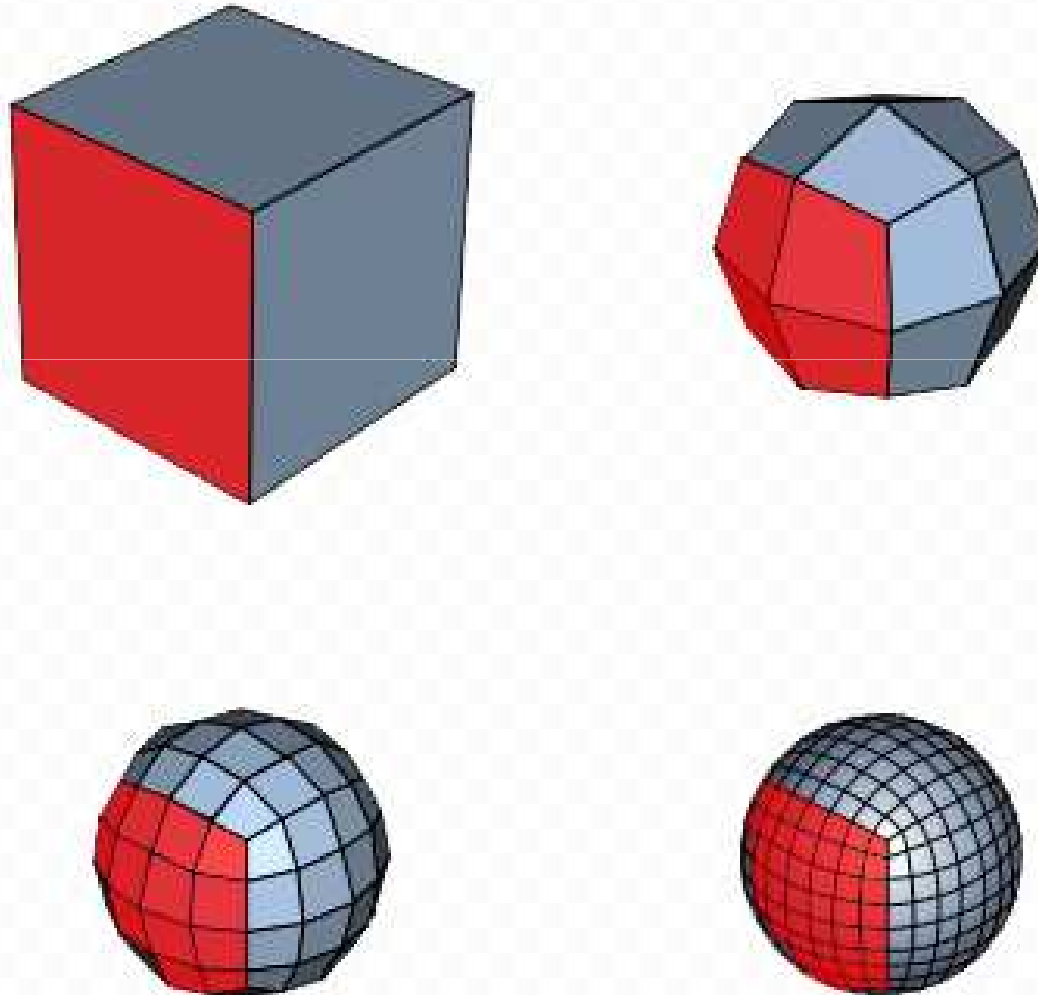
R = centroid of midpoint of edges

V = original vertex

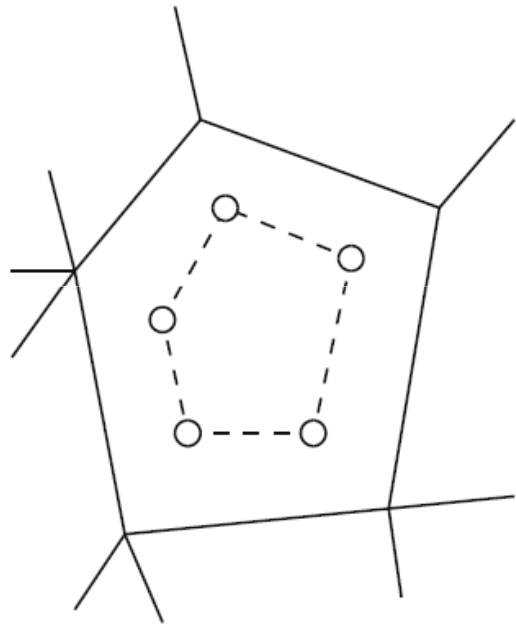
n = degree of the vertex



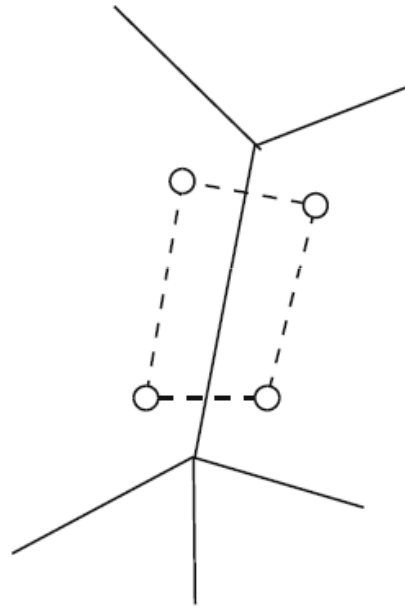
Catmull-Clark



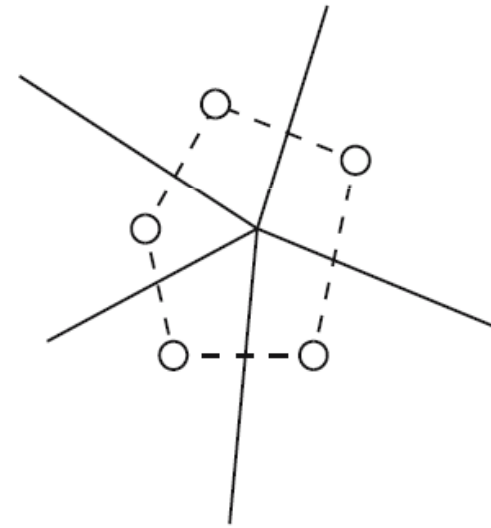
Doo-Sabin



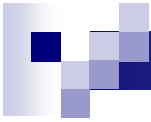
type F



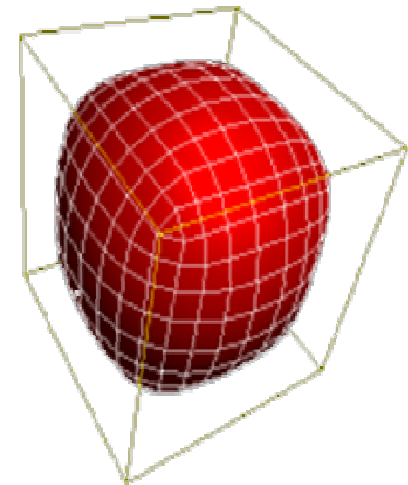
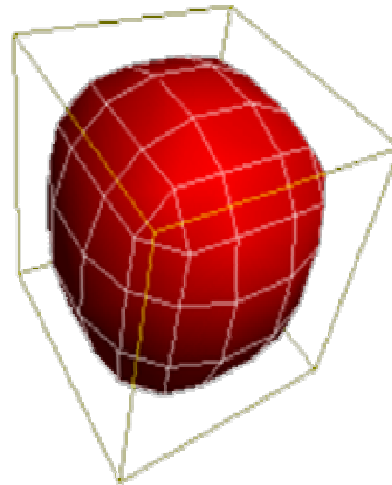
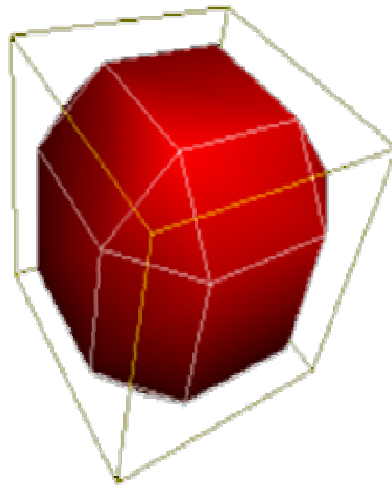
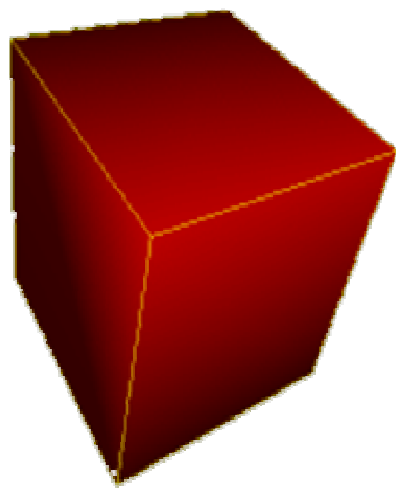
type E



type V

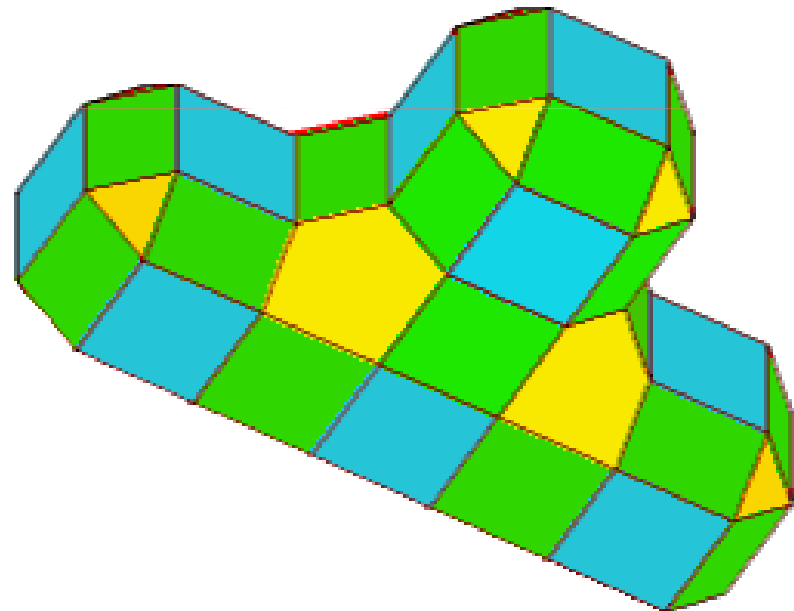
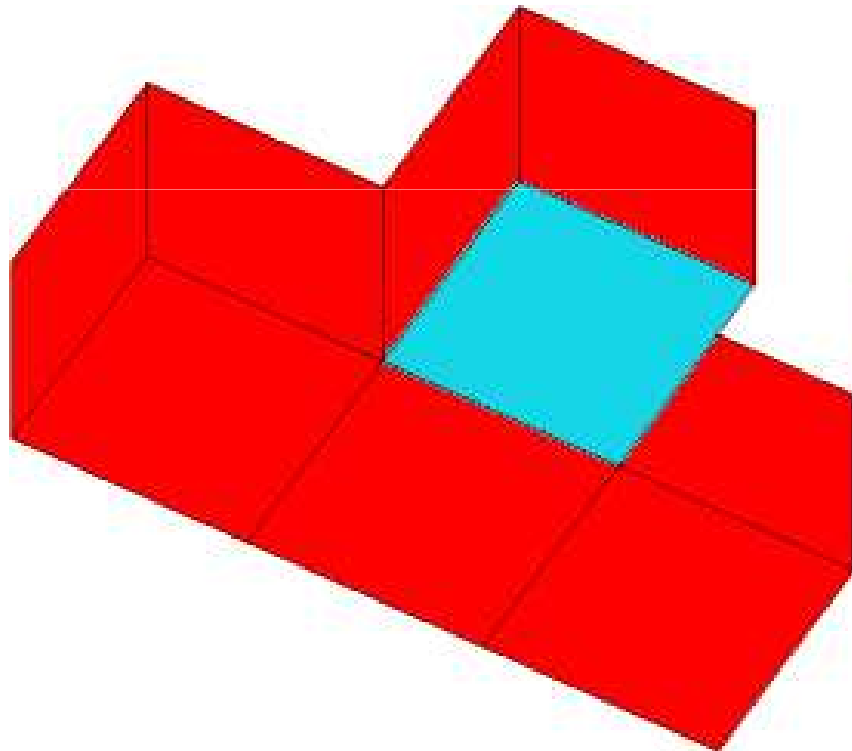


Doo-Sabin

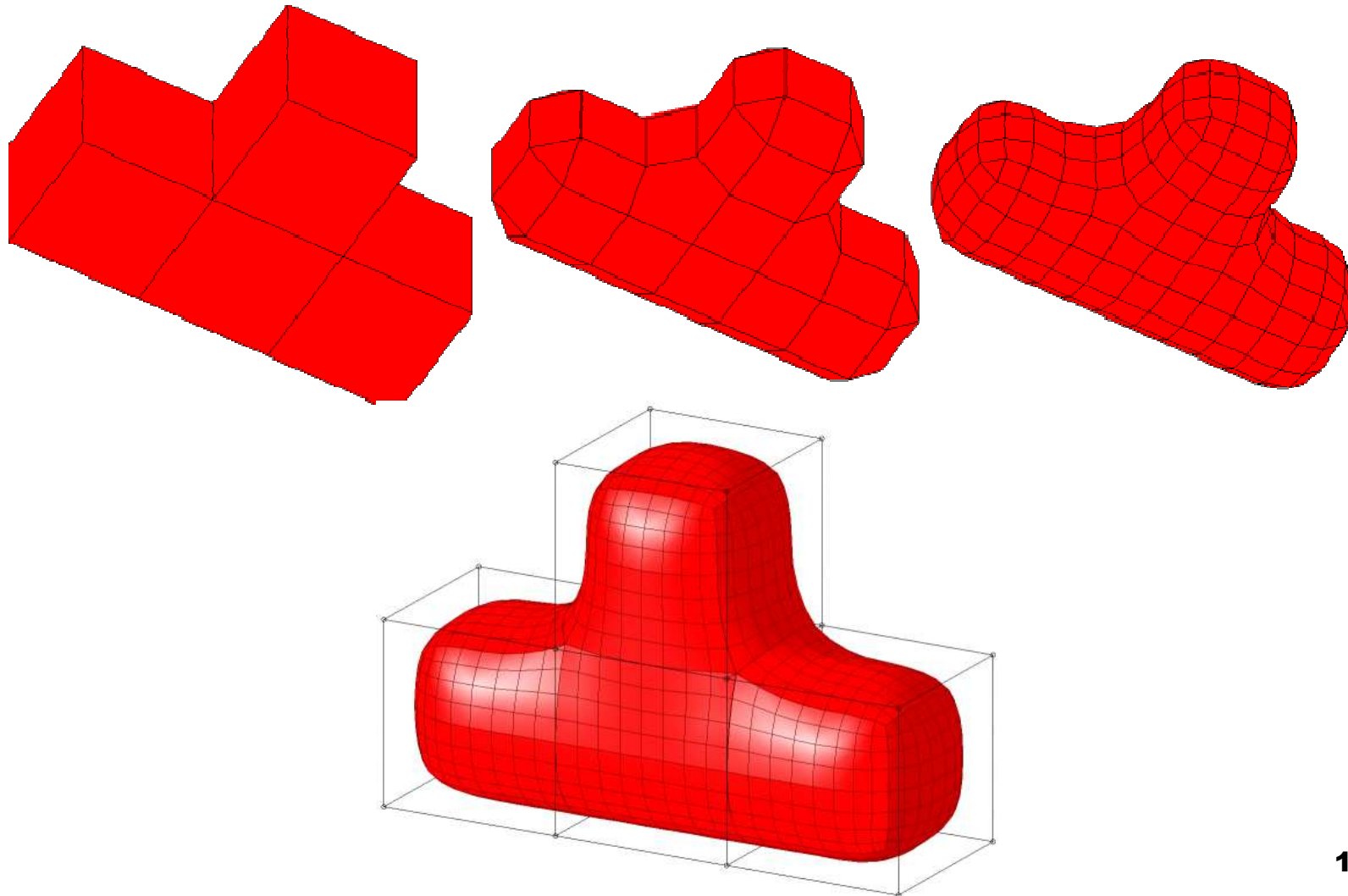


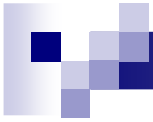


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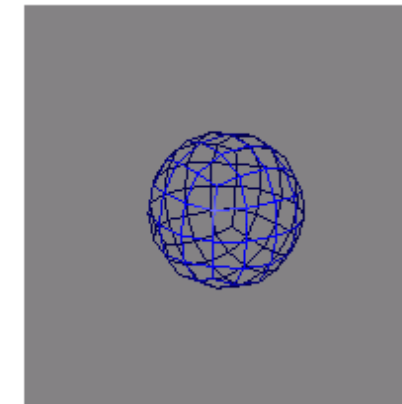
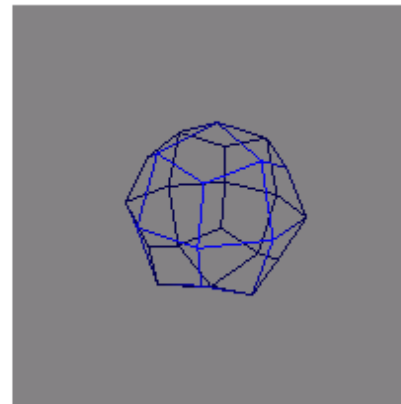
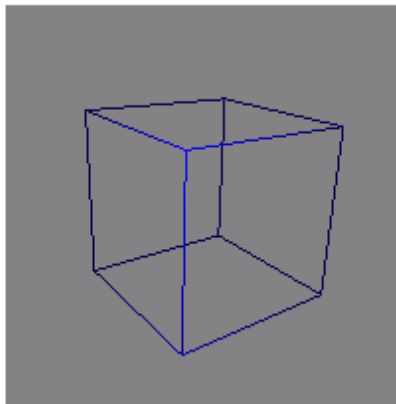
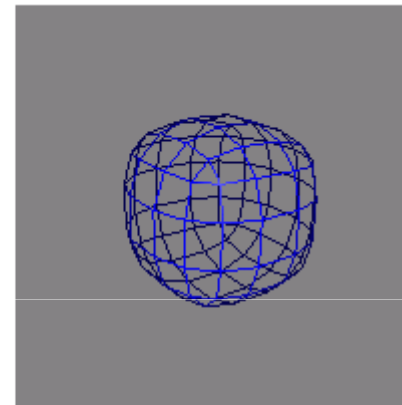
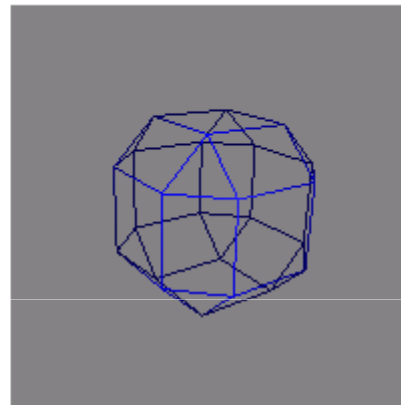
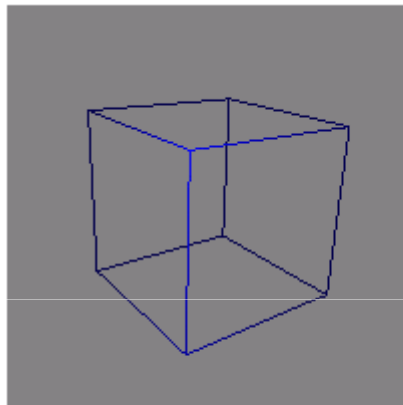


Doo-Sabin



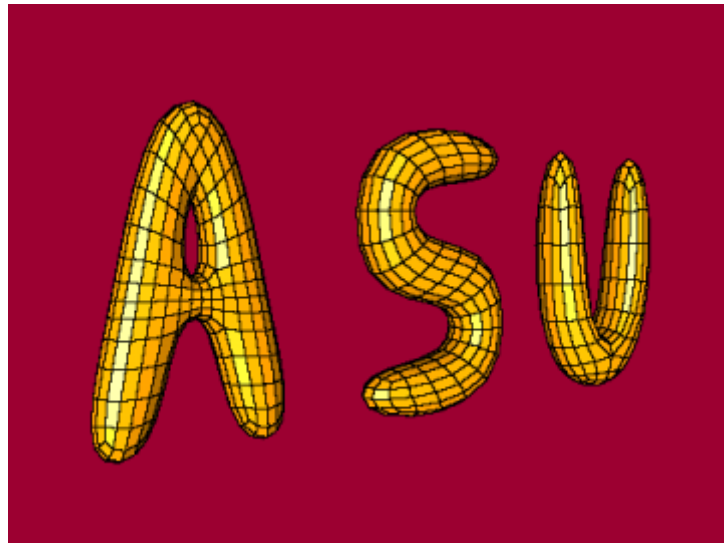
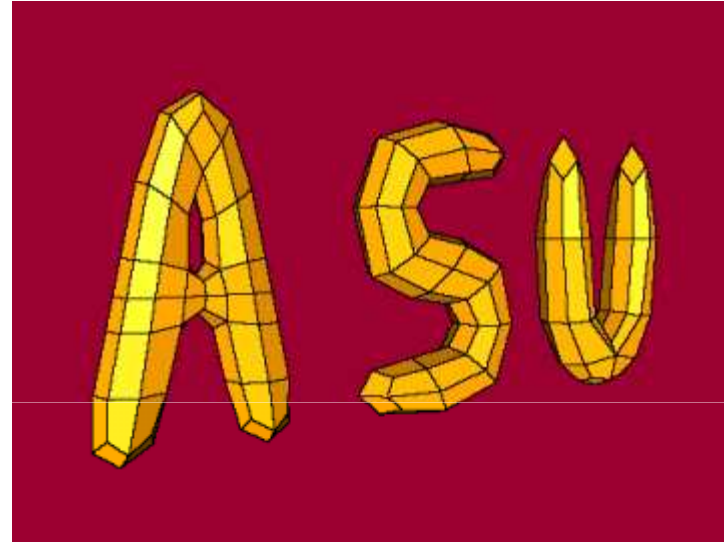


Comparison





Comparison





Catmull-Clark

Catmull, E. and Clark, J.: *Recursively generated B-spline surfaces on arbitrary topological meshes*. Computer-aided design, 10(6), pp 350-355, 1978