

Figure 8: CSG Example – Algorithm 4.1 was used to find the curve of intersection between a bumpy sphere surface and a cylinder surface. The output of the algorithm was used in a parametric trimming operation, resulting in the subtraction of the cylinder from the bumpy sphere on the top, and the subtraction of the bumpy sphere from the cylinder on the bottom.

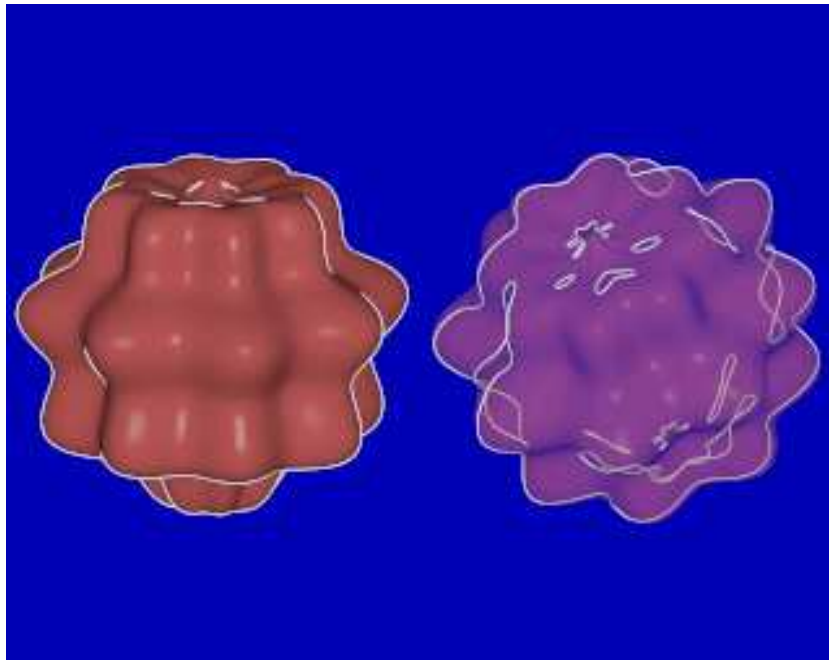
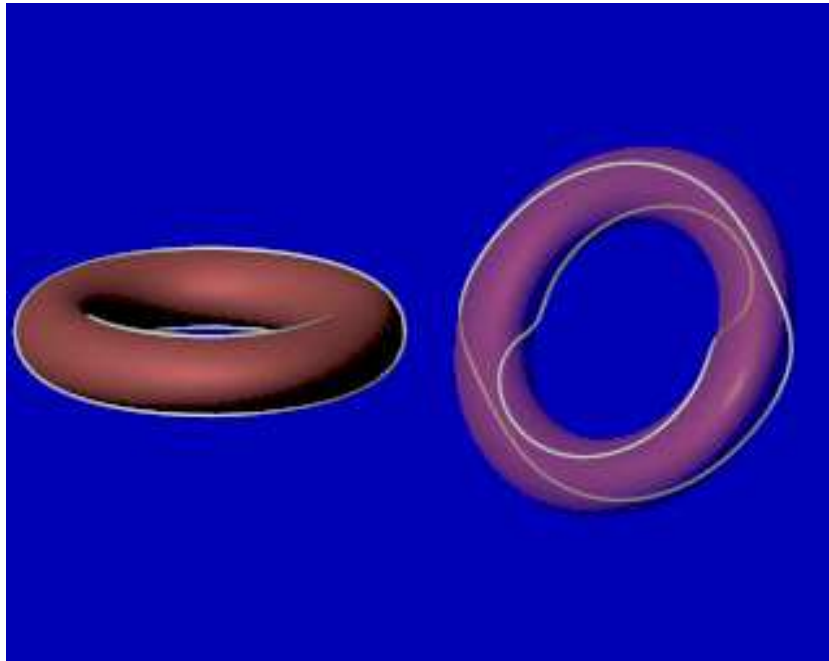


Figure 9: Silhouette Edge Detection Example – The figures show the results of the implicit curve approximation algorithm to approximate the silhouette curve of a parametric surface, $S(u, v)$, with respect to a given (in this case, orthographic) view. The implicit curve is the solution in two variables, u and v , of the equation $E \cdot \left(\frac{\partial S}{\partial u} \times \frac{\partial S}{\partial v} \right) = 0$ where $S(u, v)$ is the parametric surface and E is the viewing direction.

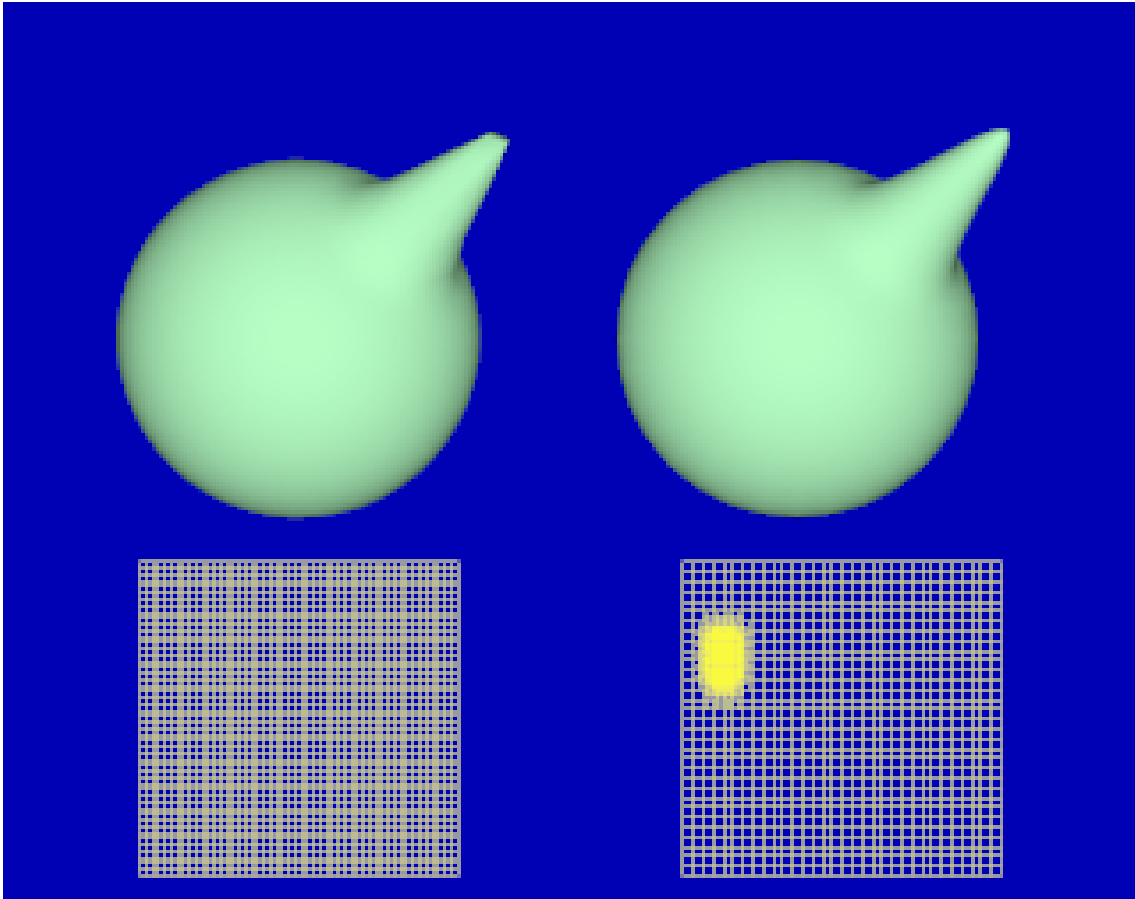


Figure 10: Polygonal Decomposition Example – The figure on the left shows polygonal decomposition based on uniform sampling in parameter space. On the right, the same surface has been decomposed using a slightly smaller number of triangles, using the constrained partitioning algorithm, which subdivides the parameter space (shown below the two surfaces) until the maximum variation in the surface normal is below a threshold. Polygonal artifacts on the highly curved projection are much reduced.

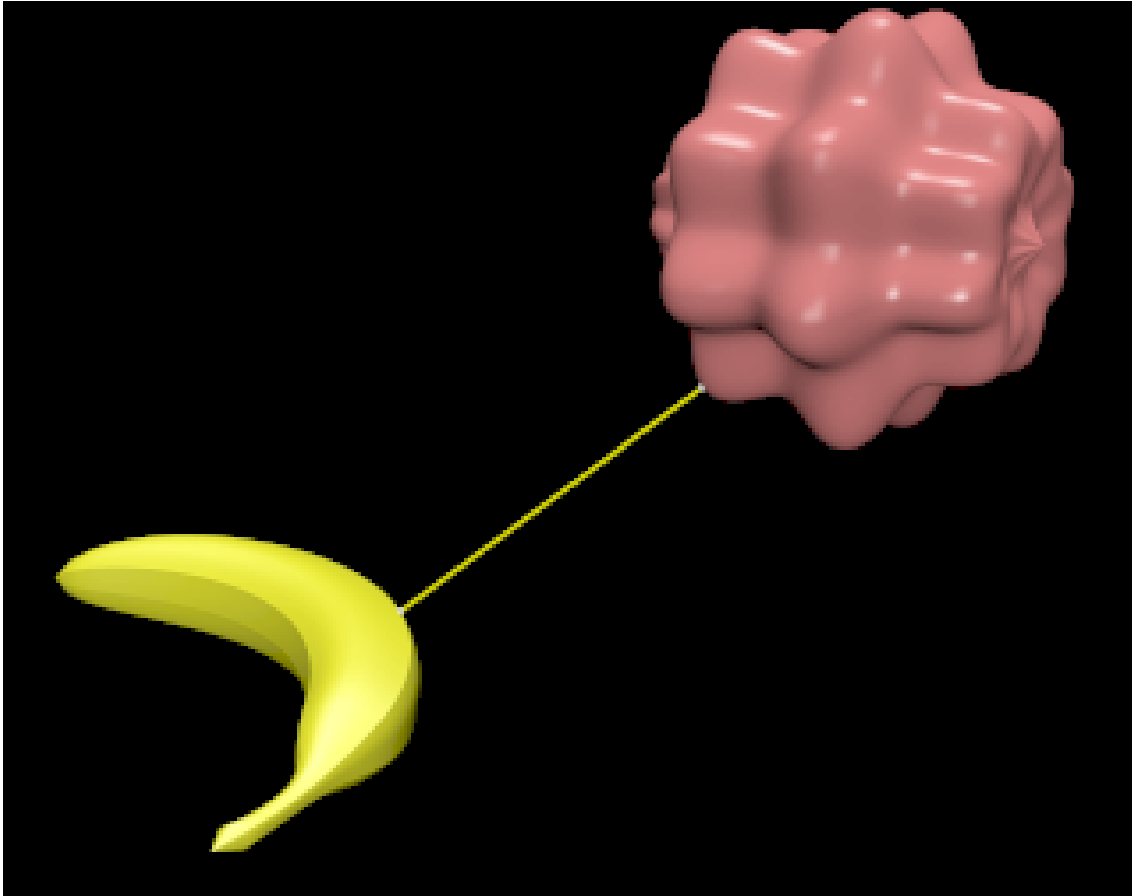


Figure 11: Minimum Distance Computation Example – The results of the minimization algorithm to find the minimum distance between two parametric surfaces is displayed. The yellow line connects the points on the two surfaces closest to each other. In this case, a single global minimizer was found for the unconstrained minimization problem of Formula 2 in Section 1.2.