Programming #4: Part I (4190.410)

Due: November 25, 2015

Given a polyline L interpolating $(N+1)$ points $\mathbf{p}_i$, $(i = 0, \cdots, N)$, apply the four point principle to generate an interpolating polyline $L^{(1)}$ with $(2N+1)$ points $\mathbf{p}_j^{(1)}$, $(j = 0, \cdots, 2N+1)$:

$$
\begin{aligned}
\mathbf{p}_{2i}^{(1)} &= \mathbf{p}_i, \\
\mathbf{p}_{2i+1}^{(1)} &= \frac{1}{16}\left[-\mathbf{p}_{i-1} + 9\mathbf{p}_i + 9\mathbf{p}_{i+1} - \mathbf{p}_{i+2}\right].
\end{aligned}
$$

Repeat the subdivision step three times to generate the polyline $L^{(3)}$ with $(8N + 1)$ points.

Generate a tube-like surface by sweeping a circle (approximated with a regular 32-gone) along the polyline $L^{(3)}$ and render the surface with an environment map.