

Programming #4: Part III (4190.410)

Due: December 25, 2013

A bicubic Bézier surface $S(u, v) = \sum_{k=0}^3 \sum_{l=0}^3 \mathbf{b}_{kl} B_k^3(u) B_l^3(v)$, $0 \leq u, v \leq 1$, can be approximated by a dense mesh sampled at the uniform parameters: $u_i = i/511, v_j = j/511$, for $i, j = 0, \dots, 511$. Implement a shadow mapping technique for the Bézier surface $S(u, v)$. You may assume a directional light coming from infinity and the Bézier surface is located above a horizontal plane.

Design an interactive system that can control the shape of $S(u, v)$ by dragging its control points projected onto the xy , yz , and zx -planes. The connected network of 16 control points can be displayed as a wireframe of 24 edges, each connecting two adjacent control points.