Nanyang Technological University

**Lab 4 Report:**

**Implicit Solids**

CZ2003 Computer Graphics and Visualization

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**One complex shape using set-theoretic operations in min/max**

|  |  |
| --- | --- |
| Shape |  |
| Explanation | This complex shape is defined in the file “ComplexShape.wrl”.  The partial shapes included in the formation of this shape are:   * An ellipsoid: 1 - (x/0.5)^2 - (y/1)^2 - (z/0.3)^2 0 * A cylinder: min(1 - (x/0.2)^2 - (y/0.2)^2 , 0.5 – z , z) 0 * A cone: min(z, ((z-1)\*0.2)^2-x^2 - y^2) 0 * A plane half-surface: z   The final shape is the intersection of the plane half-surface and the union of the ellipsoid, the cylinder and the cone. |

**Rendering the shape within 5 seconds**

|  |  |
| --- | --- |
| Shape |  |
| Explanation | This complex shape is defined in the file “ComplexShape with BBox.wrl”.  This shape can be rendered within 1 second only.  The complex shape is identical to the shape defined in “ComplexShape.wrl”, but surrounded by a bounding box. The bounding box is centered at (0,0,0) and its sizes are (2,2,2). |

**Adjusting the color**

|  |  |
| --- | --- |
| Shape | Explanation |
|  | This is a screenshot of “ComplexShape recolored.wrl”.  The complex shape is identical to the shape defined in “ComplexShape.wrl”, but the color model is different.  The color model of this shape is:  r = u+0.5  g = (v+1)/2  b = w  Since x ranges from -0.5 to 0.5, the value of r would be in the range [0, 1].  y ranges from -1 to 1, so the value of g would be in the range [0, 1] too.  w ranges from 0 to 1, so the value of b would also be in the range [0,1]. |
|  | This is a screenshot of “ComplexShape with BBox recolored.wrl”.  The complex shape and the color model are identical to those defined in “ComplexShape recolored.wrl”, but surrounded by a bounding box. The bounding box is centered at (0,0,0) and its sizes are (2,2,2). |