CZ2003 Computer Graphics and Visualization

Report for Lab 4

In this report complex objects created using boolean operations of implicit equations are presented.

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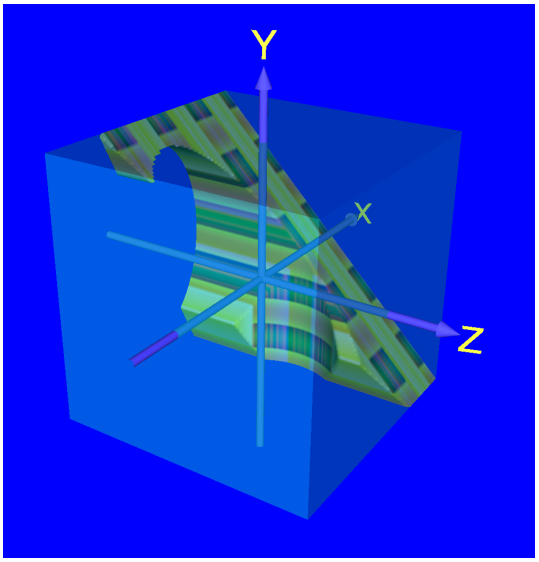
Problem 1: Complex solid shapes

Plane

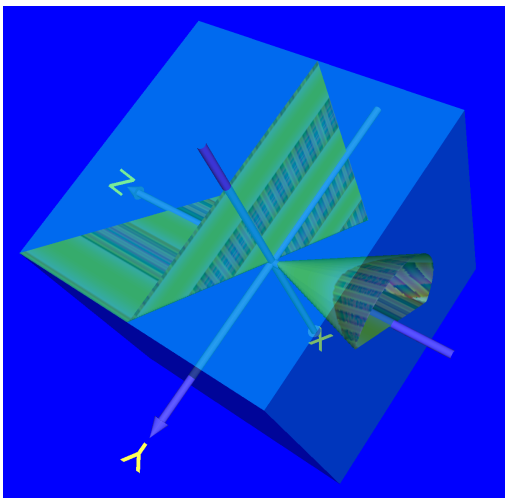
To create the following object I took the implicit equation of plane half-space and performed various subtractions of cylinders and another sphere. For colouring trigonometric equations were used which resulted in a pattern due to the high frequency of the wave. Since the shape was displayed within 5 seconds and since the representation is acceptable there was no need to change the resolution



A plane using the domain $[-0.5, 0.5]$ *on both* u *and* v

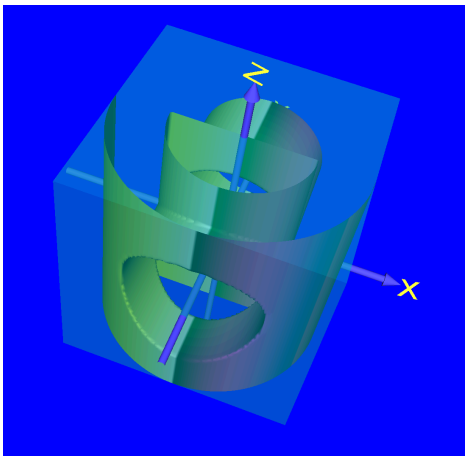
Cone

The equation of a cone in implicit form is given by $0 = (x^2 + y^2)/c^2 - (z_0 - z)^2$. In this example the shape was a result of subtracting two planes, the first to split the equation into a single cone and the other to split the cone in half. The colour was made using trigonometric functions with lower frequency and thus longer periods. Due to the circular shape of the cone a higher resolution was needed.



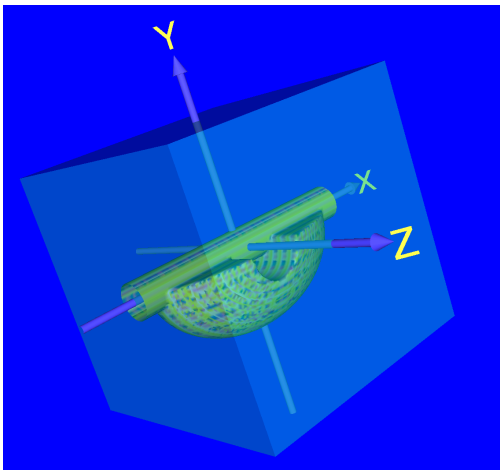
Cylinder

This shape was made with multiple cylinders using various boolean operations. As opposed to previous colouring, this shape uses linear functions to define the colour.



Ellipsoid

Finally the ellipsoid was made using subtractions of a cylinder and a plane and an addition of a cylinder. The



difference of pattern on the ellipsoid versus cylinder can be explained by the cylinder being constant in the y-axis which displays lines instead of a square-like pattern. Again no change in resolution was needed to display the shape in less than 5 seconds.