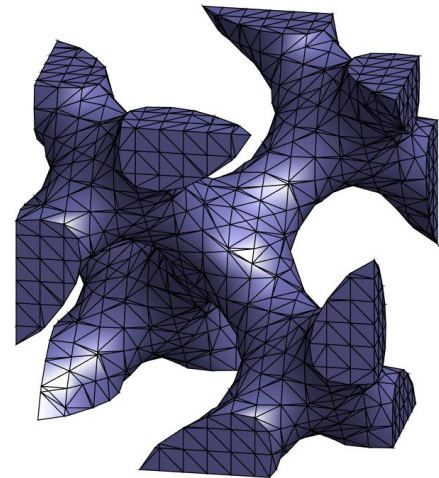


Problem #1: Build a Diamond Lattice Unit Cell

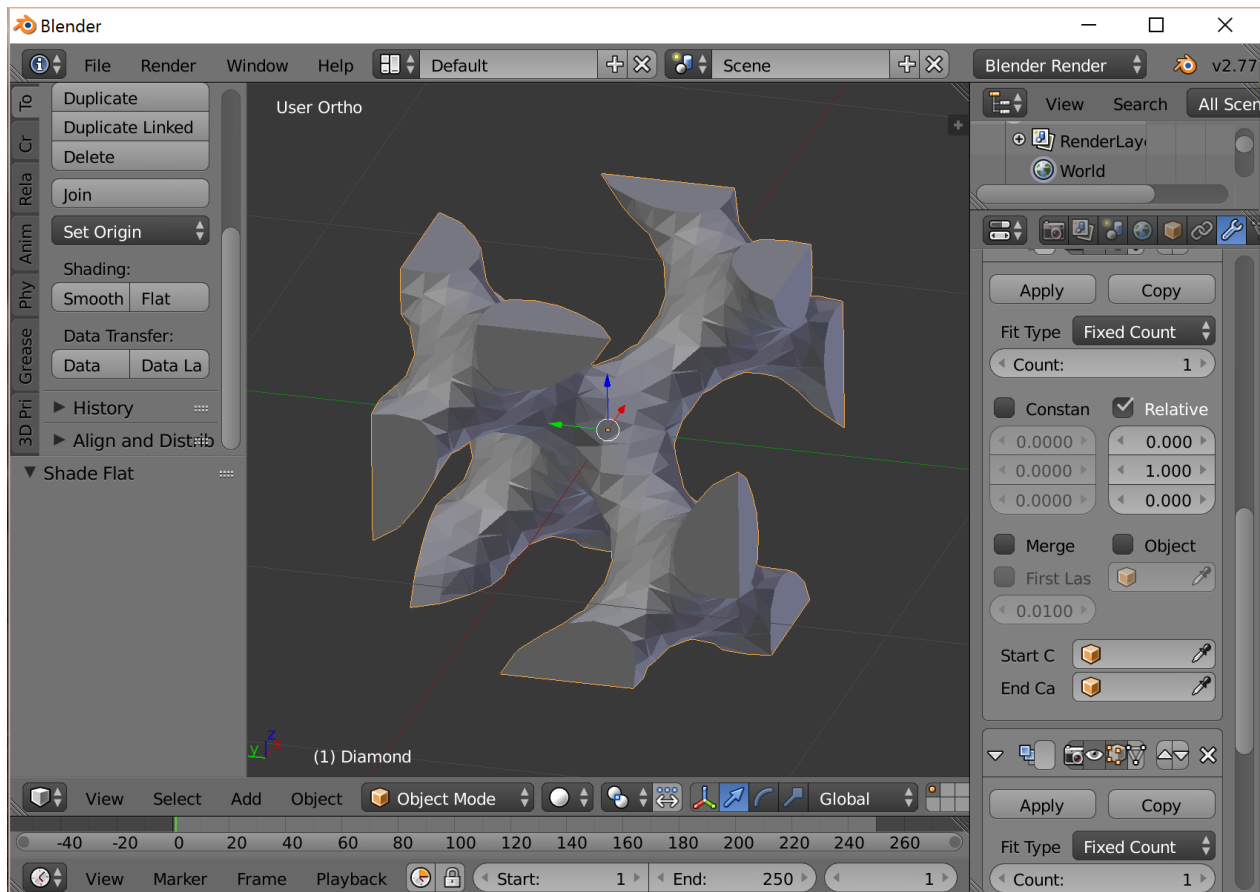
Write a MATLAB program to build a 3D unit cell of a diamond lattice with lattice constant $a=1.0$ cm in a 3D Cartesian grid. The shape can be anything you wish, but it must be inhomogeneous and have diamond symmetry. Further, the lattice must be fully connected and not contain any “floating” or isolated pieces. Create a surface mesh in MATLAB using `isosurface()` and `isocaps()`. Visualize the unit cell using the `patch()` function and report the total number of faces and total number of vertices. One possible diamond unit cell is shown here.



Diamond lattice: 3044 faces, 1896 vertices

Problem #2: Export the Unit Cell to an STL File

Starting with Problem #1, export the faces and vertices to a binary STL file. Import the STL file of the unit cell in Blender and provide a screen capture of the unit cell loaded into Blender.



Problem #3: Array Unit Cell to Create a 3D Lattice

Using Blender, array the unit cell to create a 3D lattice containing $5 \times 5 \times 5$ unit cells. Export the lattice as a single STL file. Provide a rendered image of the lattice. You may get “creative” with the rendered image if you wish, as long as the details of the lattice can be seen clearly.

