

3D Multiplatform Data Visualization

Kharchenko K.V.¹, Kornachevskyy Y.I.¹

¹National Technical University of Ukraine "Kyiv Polytechnic Institute"

konst@cad.kiev.ua, yaroslav@cad.kiev.ua

37 Peremogy ave, Kyiv, Ukraine

3d data visualization tools are widely used by scientists. The main deficiencies of the most used tools are their single platform destination and very low performance while working with huge amount of data, and weak means for user-oriented data representation.

To overcome these shortcomings it is proposed to utilize OpenGL graphic library.

The first one, single platform destination, was fixed by creation of all-new graphical user interface based on existing OpenGL primitives. The GTK (Geometric Tool Kit) library has the following GUI controls: menus, push-buttons, radio-buttons, labels, scroll-bars, edit-text boxes. That allowed fast creation of main application window, menus, toolbars and dialogs. All widgets have callbacks for interaction with user.

Scientific experiments often characterized by a huge amount of 3d data, which is actually a set of three coordinates, representing x, y, and value, aimed to be z-coordinate. To display such a data, visualization system will need some approach to reform points into surface. For this task proposed to use Delaunay triangulation, which builds triangle mesh over a set of points. For big arrays of data proposed to use cluster version of Delaunay triangulation, which breaks task into small parts.

To improve data readability proposed to allow user to show surface in several modes (point, wire, solid, wire+solid, 3d with z=0 and textured). The latest allows significantly increase data readability by placing different grids into texture (and correspondingly onto surface). The next step is application of vertex and pixel shaders, which allows user to present data in the best way by means of small routines for additional data processing.