



Software complex for geophysical data visualization

Ilya A. Kryukov, Dmitry Y. Tyugin, Andrey A. Kurkin, and Oxana E. Kurkina

Nizhny Novgorod State Technical University n.a. R.E. Alekseev, Nizhny Novgorod, Russian Federation
(ilyakrukov@gmail.com)

The effectiveness of current research in geophysics is largely determined by the degree of implementation of the procedure of data processing and visualization with the use of modern information technology. Realistic and informative visualization of the results of three-dimensional modeling of geophysical processes contributes significantly into the naturalness of physical modeling and detailed view of the phenomena. The main difficulty in this case is to interpret the results of the calculations: it is necessary to be able to observe the various parameters of the three-dimensional models, build sections on different planes to evaluate certain characteristics and make a rapid assessment.

Programs for interpretation and visualization of simulations are spread all over the world, for example, software systems such as ParaView, Golden Software Surfer, Voxler, Flow Vision and others. However, it is not always possible to solve the problem of visualization with the help of a single software package. Preprocessing, data transfer between the packages and setting up a uniform visualization style can turn into a long and routine work. In addition to this, sometimes special display modes for specific data are required and existing products tend to have more common features and are not always fully applicable to certain special cases. Rendering of dynamic data may require scripting languages that does not relieve the user from writing code. Therefore, the task was to develop a new and original software complex for the visualization of simulation results.

Let us briefly list of the primary features that are developed. Software complex is a graphical application with a convenient and simple user interface that displays the results of the simulation. Complex is also able to interactively manage the image, resize the image without loss of quality, apply a two-dimensional and three-dimensional regular grid, set the coordinate axes with data labels and perform slice of data.

The feature of geophysical data is their size. Detailed maps used in the simulations are large, thus rendering in real time can be difficult task even for powerful modern computers. Therefore, the performance of the software complex is an important aspect of this work. Complex is based on the latest version of graphic API: Microsoft - DirectX 11, which reduces overhead and harness the power of modern hardware.

Each geophysical calculation is the adjustment of the mathematical model for a particular case, so the architecture of the complex visualization is created with the scalability and the ability to customize visualization objects, for better visibility and comfort.

In the present study, software complex 'GeoVisual' was developed. One of the main features of this research is the use of bleeding-edge techniques of computer graphics in scientific visualization.

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