Scientific visualization in web applications

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In view of the rapid development of Internet technologies it becomes possible to create applications that process data in online mode. The important part in such applications is scientific data visualization subsystems. As the computational and graphical capabilities of mobile devices have increased dramatically it has become possible to create cross-platform systems for scientific visualization, working both on users' computers and on their mobile devices, without the need to install other software than a web browser.

In the framework of the unified system of calculation management "KIAM Multilogin" [1], which is an online environment for task-management, computational-management and data storage, technologies such as vtk.js [2] and bokeh [3] were tested. The choice fell on these libraries, because VTK is a common standard for visualization, and there are not much alternatives for in-browser interactive plots, based on server-side data sets.

The Visualization Toolkit JS (vtk.js) is an open software system for 3D computer graphics. It can be integrated into any web application. It uses technology such as WebGL and supports many visualization algorithms. It also adapts the vtk structure, which allows you to make high-performance 3D applications in a web browser.

Bokeh is an interactive data visualization library for Python that targets modern web browsers for presentation. It can create versatile, data-driven graphics, and connect the full power of the entire Python data-science stack to rich, interactive visualizations.

In appliance of the developed service, these libraries helped to implement an application, that allows to visualize CFD calculation in interactive way. Also it gave an opportunity to visualize large data sets from CFD and Molecular Dynamics computing of the gas flows.

REFERENCES

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[2] VTK.js documentation: https://kitware.github.io/vtk-js/docs/

[3] Bokeh documentation: https://bokeh.pydata.org/en/latest/docs/user_guide.html