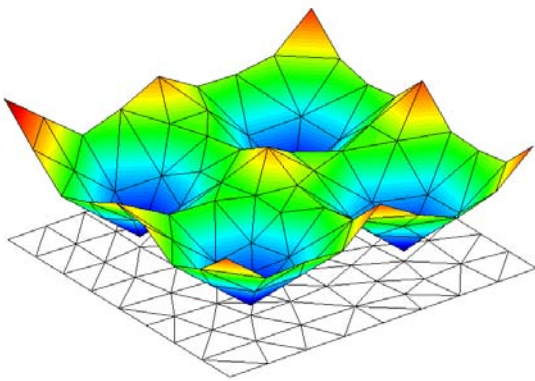


# Implementation of high-order Finite-Element visualization based on the C++ libraries of QT and VTK

In Finite-Element analysis the visualization of the calculated results is a fundamental step to evaluate the behaviour of simulated structures. In this software-lab project a graphical user interface (GUI) for the visualization of Finite-Element meshes and results will be developed.



Finite-Element mesh with result

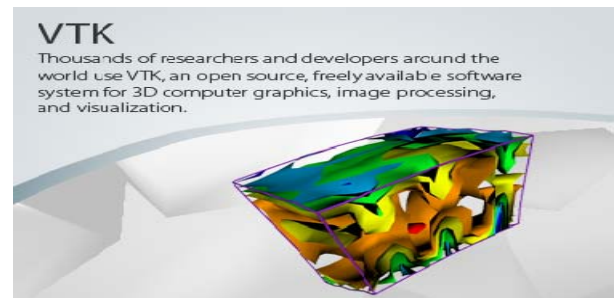
For the visualization of numerical data such as Finite-Element meshes and results there exists a large number of visualization tools. The implementation of such tools is based on visualization and displaying techniques provided by visualization toolkits such as e.g. **OpenGL** and **DirectX** on hardware-level language or **VTK** and **Open CASCADE** on a more advanced library level. Graphical user interface libraries (e.g. **Qt**, **MFC**) are used as framework to implement such programs. This software-lab will develop a visualization tool based on the visualization libraries of **VTK** in combination with the GUI-libraries of **QT**.

## Tasks:

- Getting familiar with object-oriented programming in C++
- Getting familiar with the graphical user interface (GUI) libraries of **QT**
- Getting familiar with the visualization toolkit **VTK**
- Implementing a GUI-window for Finite-Element visualization
- Implementing visualization features such as rotation, zoom, panning or picking
- Implementing visualization of Finite-Element results (color coding, nodal displacement)
- Implementing visualization of dynamic results (movie)



Example: GUI with Qt



Example: VTK visualization toolkit

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## References

- [1] <http://qt.nokia.com/>
- [2] <http://www.vtk.org/>