

Motivation

So far `matplotlib` has been the standard for post processing results from **FEniCS** python scripts: good for visualizations of 2D meshes but way insufficient for 3D renderings.

vtkplotter, a 3rd party python module, aims at filling this gap and allows to:

- Create publication-quality 2D/3D images and plots
- Embed 3D interactive scenes in notebooks (via the `K3D` backend²)
- Facilitate the exchange of results among researchers by exporting 3D scenes.

Easy to install and use:

```
> pip install vtkplotter
```

Basic API interface is simply:

```
from dolfin import *

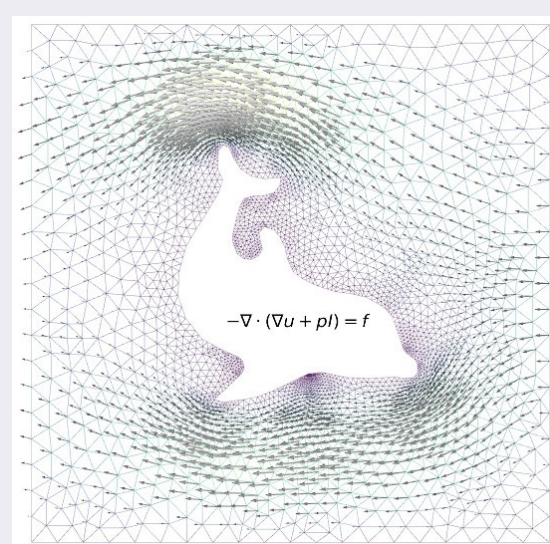
#...
solve(a == L, u)
#...

from vtkplotter.dolfin import plot

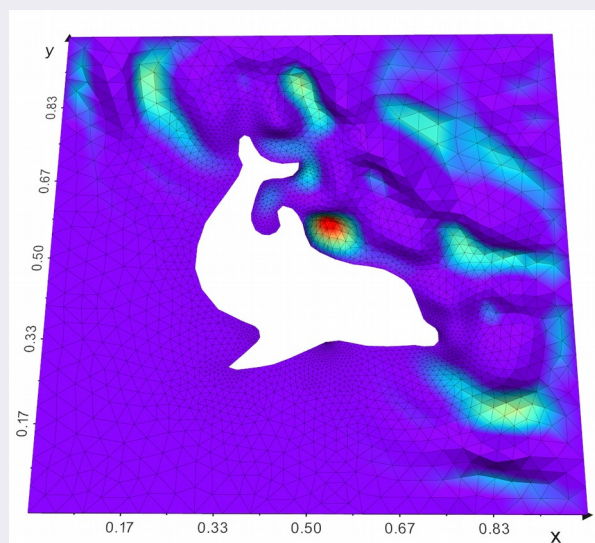
plot(u)
```

Features and Image Gallery

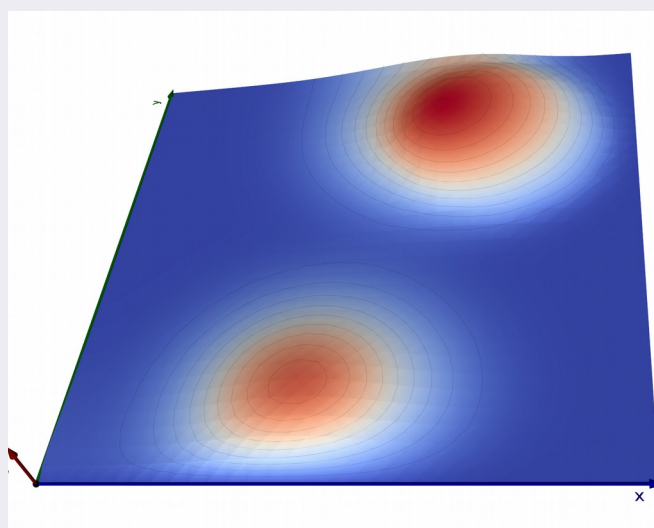
- Any object/mesh can be added to the rendering, not limited to the solution, all displayed meshes can be manipulated like any other standard `vtk` object (e.g. calculate areas/volumes, color-code mesh differences etc..)
- Other features include: embed *latex* formulas in the 3D rendering, generate isolines, multiple *sync-ed* window displays, customizable axes styles, etc..



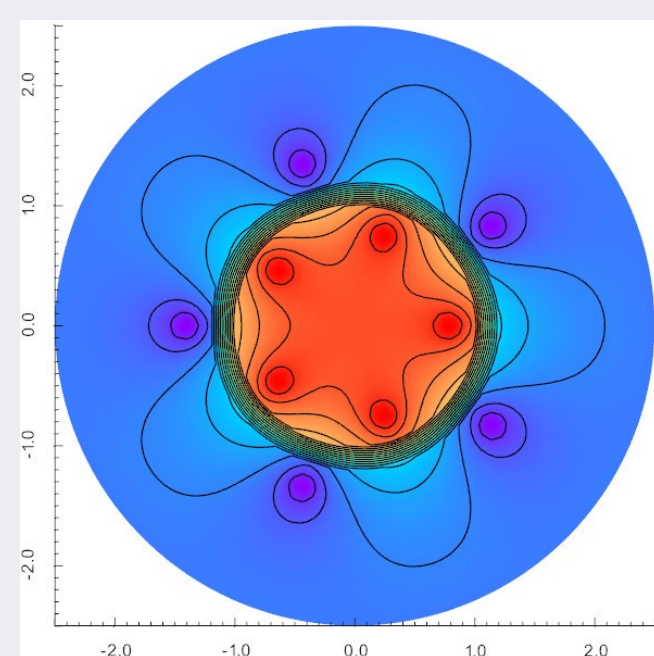
Solving the Stokes equations



The wave equation in 2 dimensions

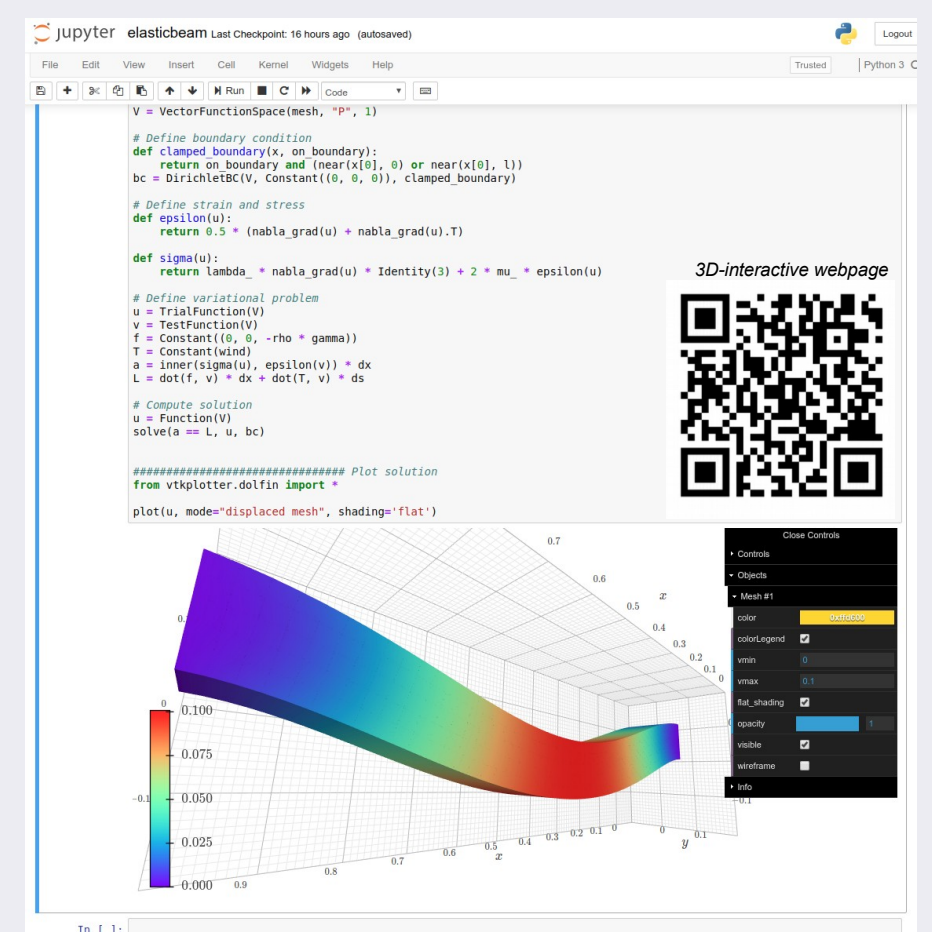


Heat equation in a moving media

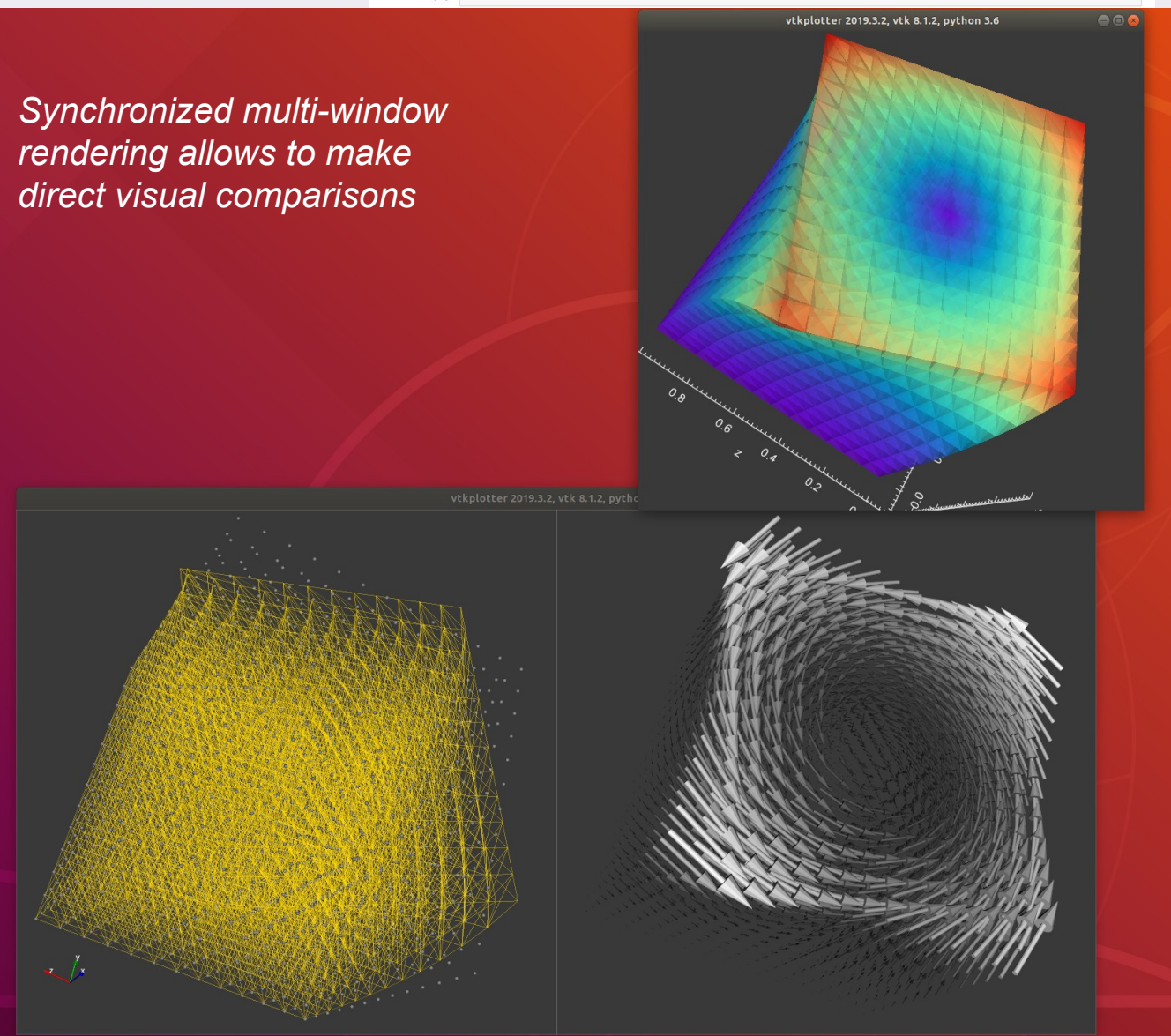


Magnetic field of a solenoid with isolines

Scan to see a gallery with animations



Synchronized multi-window rendering allows to make direct visual comparisons



CONCLUSION/OUTLOOK

A new tool to complement `matplotlib` is now available for **FEniCS**.

Future developments may include: generation of stream-lines from vector fields, visualization of tensors, volumetric rendering and isosurfacing.

→ Have you found a bug or wish to request a missing feature?

Submit an issue to the github webpage or by email at: marco.musy@embl.es

REFERENCES

1. M. Musy et al., "vtkplotter, a python module for scientific visualization and analysis of 3D objects and point clouds based on VTK (Visualization Toolkit)", Zenodo, 10 February 2019, doi:10.5281/zenodo.2561402.
2. K3D-jupyter module by A. Trzesiok et al. is available at: <https://github.com/K3D-tools/K3D-jupyter>

