

Viper User Manual

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About this manual

This manual is currently being written. As a consequence, some sections may be incomplete or inaccurate.

Intended audience

This manual is written both for the beginning and the advanced user. There is also some useful information for developers. More advanced topics are treated at the end of the manual or in the appendix.

Typographic conventions

- Code is written in monospace (typewriter) like `this`.
- Commands that should be entered in a Unix shell are displayed as follows:

```
# ./configure
# make
```

Commands are written in the dialect of the `bash` shell. For other shells, such as `tcsh`, appropriate translations may be needed.

Enumeration and list indices

Throughout this manual, elements x_i of sets $\{x_i\}$ of size n are enumerated from $i = 0$ to $i = n - 1$. Derivatives in \mathbb{R}^n are enumerated similarly: $\frac{\partial}{\partial x_0}, \frac{\partial}{\partial x_1}, \dots, \frac{\partial}{\partial x_{n-1}}$.

Contact

Comments, corrections and contributions to this manual are most welcome and should be sent to

`viper-dev@fenics.org`

Chapter 1

Introduction

Viper is a light-weight runtime visualization package for scalar and vector fields over unstructured meshes. The intended use is simple plotting, not advanced post-processing. As a consequence, Viper is mainly controlled by key-bindings, available when Viper is run in interactive mode.

1.0.1 Features

Viper can be used in two different modes; one mode that is stand-alone working with a simplified unstructured mesh format given by a vertex array and a cell - node connectivity array, and floating point numpy arrays representing either scalar or vector fields over the mesh. The other mode is tied to DOLFIN, aiming at providing that project a simple way of visualizing native DOLFIN data types such as `dolfin::Mesh`, `dolfin::Function`, and `dolfin::MeshFunction`.

1.0.2 Stand-alone mode

As a stand-alone application or library, Viper can visualize:

- A mesh given as two numpy arrays. For example:

```
import numpy as _n
import viper

coords = _n.array([[0.0, 0.0, 0.0], [1.0, 0.0, 0.0],
                  [0.0, 1.0, 0.0], [1.0, 1.0, 0.0]])
triangles= _n.array([[0,1,2],[1,2,3]], dtype='i')
v = viper.Viper(coordinates=coords, cells=triangles)
#or, for tetrahedral meshes:
#coords = _n.array([[0.0, 0.0, 0.0], [1.0, 0.0, 0.0],
#                  [0.0, 1.0, 0.0], [1.0, 1.0, 1.0]])
#tets = _n.array([[0,1,2,3]], dtype='i')
#v = viper.Viper(coordinates=coords, cells=tets)
v.interactive()
```

- A scalar field given as a numpy array over a mesh:

```
x = _n.sin(_n.pi*coords[:,0])*_n.cos(_n.pi*coords[:,1])
v = viper.Viper(x=x, coordinates=coords, cells=triangles)
```

- A vector field given as a two dimensional numpy array over a mesh:

```
v = viper.Viper(x=coords, coordinates=coords, \
               cells=triangles)
```

- A displacement field given as a two dimensional numpy array over a mesh:

```
displacement2d = _n.zeros(coords.shape, dtype='d')
displacement2d[0,-1] = -1
v = viper.Viper(coordinates=coords, cells=triangles,
               displacement=displacement2d)
```

An auxiliary scalar field may be given when plotting displacement fields.

1.0.3 Key-bindings

In interactive mode, the following key bindings are available:

- w: Wireframe
- s: Solid
- o: Outline
- p: Write scene to file in png-format
- v: Write vtk
- r: Reset camera view along current view direction
- q: Quit interactive mode

Appendix A

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