

LCS Plugin for ParaView

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May 1, 2013

Abstract

This is user guide for using the LCS program. This program can be used as ParaView plugin or a stand alone program. Users will find building and installation process and usage examples in both terminal and ParaView.

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1 Introduction

This package has been created to extract coherent structures of the flow. The resulting output is a manifold with consistent orientation.

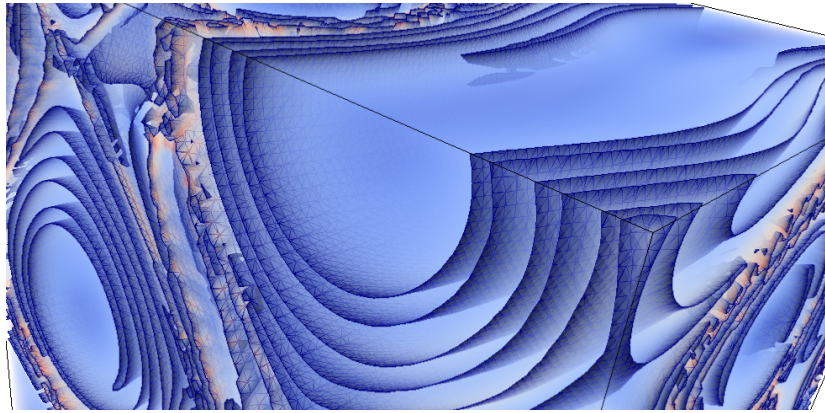


Figure 1: Max Strain LCS of ABC flow

2 Build Source

Source code can be obtained from github repository¹. Create a build directory and download the source code inside the build directory:

```
$ git clone git://github.com/ameli/lcs
$ cd lcs
$ mkdir build
```

Now, build the code:

```
$ cd build
$ cmake ..
$ make
$ make install
```

Installation directory is in `install` directory. For system wide installation, users may change `PROJECT_INSTALL_PATH` in `cmake`. For UNIX systems a preferred system wide path is `/usr/local/bin`.

3 Program Usage

The program can be used either in terminal or as a ParaView plugin. Here are examples to use it in terminal:

¹<https://github.com/ameli/lcs>

```
$ lcs /input-path/inputfile.vtk outputfile.vtk
```

For help, use `-h`, for get program information use `-i` and for see the license, use `-l` options.

```
$ lcs -h
```

```
$ lcs -i
```

```
$ lcs -l
```

The input file should be a **structured point** data. Also Cauchy-Green tensors should be included in **PointData** of the file. A sample of input data with few number line are as following:

Listing 1: Sample Input file

```
0 # vtk DataFile Version 3.0
  t = 0.000000000
  ASCII
  DATASET STRUCTURED_POINTS
5  DIMENSIONS 101 101 101
  ORIGIN -3.141593 -3.141593 -3.141593
  SPACING 0.062831853 0.062831853 0.062831853
  POINT_DATA 1030301
10 TENSORS CG double
  1841.529748 -571.912532 -688.962477
  -571.912532 178.498989 212.501996
  -688.962477 212.501996 260.187902
  ...
```

4 ParaView Plugin Usage

For using the program as a plugin, select the `BUILD_PARAVIEW_PLUGIN` while configuring in `ccmake`. After compiling the code, the two shared libraries `libDeformationPlugin.so` and `linIdentifyStructuresPlugin.so` will be created in the `bin` folder. Depending on the operating system, the extension of shared libraries are different. In Linux, the extension is `.so`, while in Mac and Windows are `.dll` and `.dylib` respectively.

Figures 2, 3 and 4 illustrates how to load the plugin and apply it to make a pipeline in ParaView. loading the plugin in ParaView. Users may find the filter in **Filter** menu under **Extensions**.

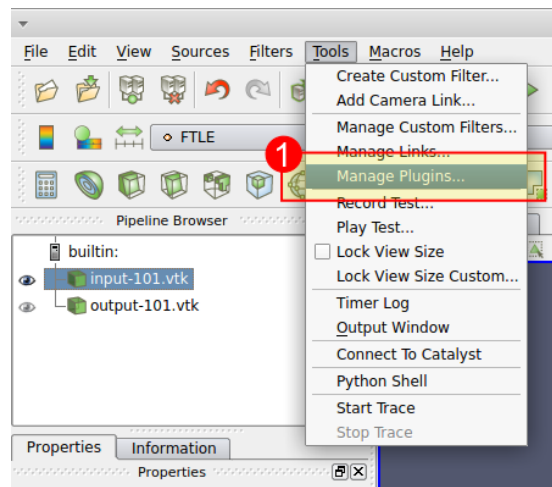


Figure 2: Manage Plugins

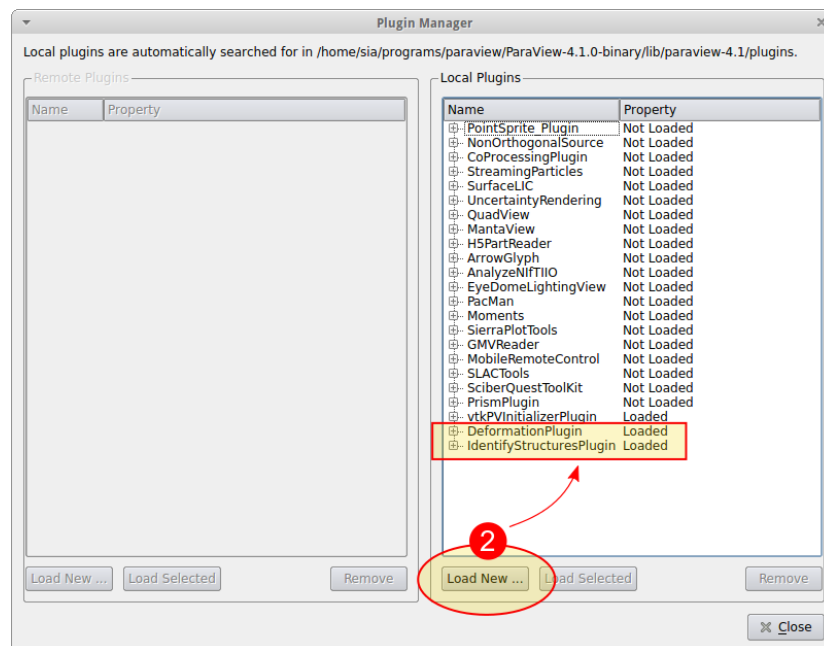


Figure 3: Load Plugins

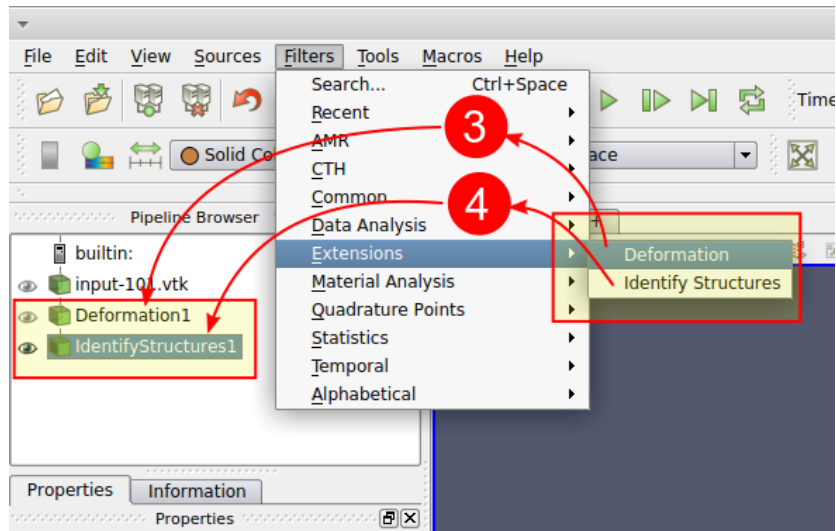


Figure 4: Apply Plugins

5 Options

Users can choose which type of deformation be used for extracting LCS. The options are

- Max Strain LCS
- Min Strain LCS
- Shear LCS (TODO)

Options of plugins as shown in figure 5.

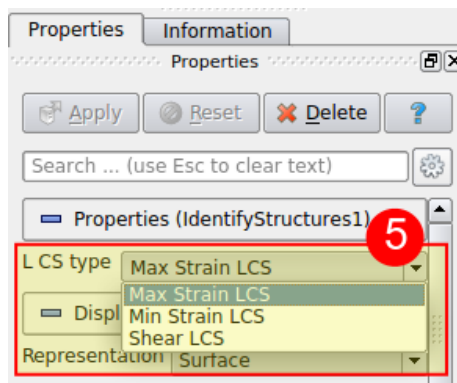


Figure 5: Setting of the Plugins

6 Example

Figure 6 shows max strain LCS for ABC flow. The resolution of initial flowmap grid is 101x101x101.

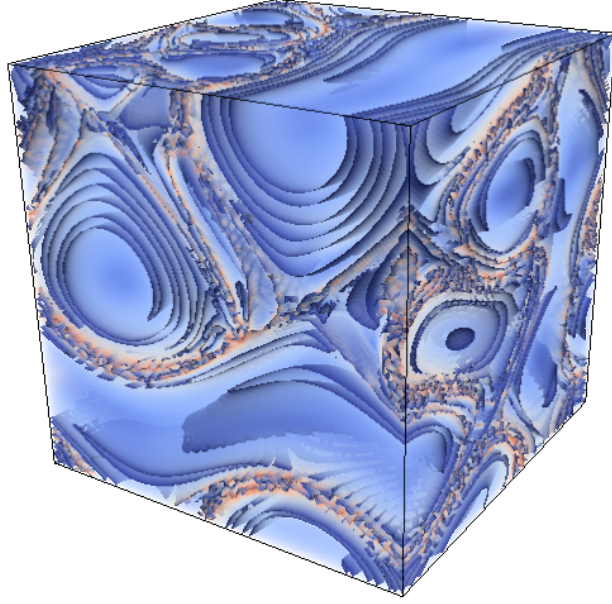


Figure 6: Max Strain LCS for ABC flow

7 License ²

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8 Bug Report

Any bug reports and comments are appreciated. You may report bugs at github ³ or send email ⁴.

9 Acknowledgement

This work was supported by the National Science Foundation, award number 1047963.

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