ParaView – Scientific Data Visualization

2017 하계 CDE학회 튜토리얼

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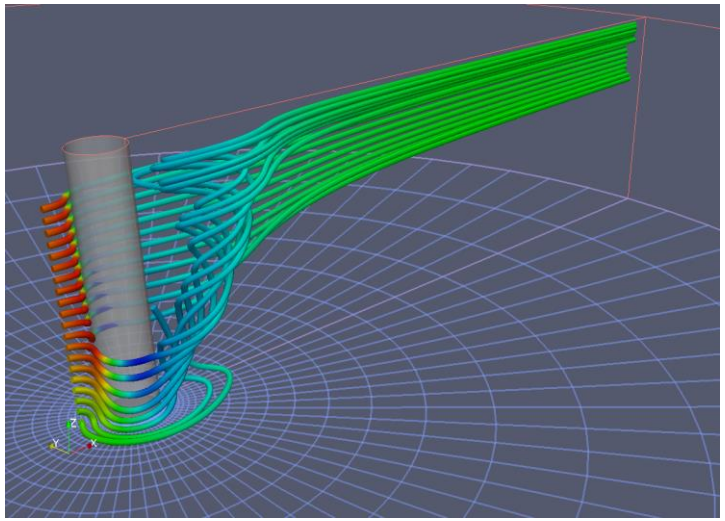
한국과학기술연구원

김 영 준

Overview

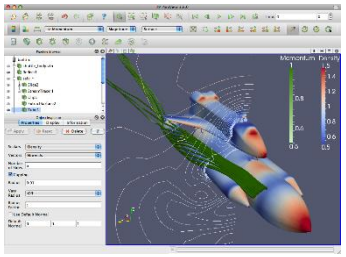
- Open-source, multi-platform visualization application.
- Support distributed computation models to process large data sets
- Open, flexible, and intuitive user interface.
- Extensible architecture based on open standards.



Large Data Visualization Made Easier

- ParaView is an open-source, multi-platform data analysis and visualization application.
- ParaView users can quickly build visualizations to analyze their data using qualitative and quantitative techniques.
- ParaView runs on distributed and shared memory parallel and single processor systems. It has been successfully deployed on Windows, Mac OS X, Linux, SGI, IBM Blue Gene, Cray and various Unix workstations, clusters and supercomputers.
- Under the hood, ParaView uses the Visualization Toolkit (VTK) as the data processing and rendering engine and has a user interface written using Qt®.

ParaView Application Architecture



ParaView Client	pvpython	ParaWeb	Catalyst	Custom App
UI (Qt Widgets, Python Wrappings)				
ParaView Server				
VTK				
OpenGL	MPI	IceT	Etc.	

ParaView Development

Started in 2000 as collaborative effort between Los Alamos National Laboratories and Kitware Inc. (lead by James Ahrens).

September 2005: collaborative effort between Sandia National Laboratories, Kitware Inc. and CSimSoft to rewrite user interface to be more user friendly and develop quantitative analysis framework.

Data Ranges

Used for all ranges of data size.

Landmarks of SNL usage:

- 6 billion structured cells (2005).
- 250 million unstructured cells (2005).
- Billions of AMR cells (2008).
- Scaling test over 1 Trillion cells (2010).

Funding

Sandia National Laboratories

ARL

ERDC

US Army (SBIR)

US Air Force (STTR)

ONR

Support Contracts

- Electricity de France
- Microsoft

- Other contributors
  - Swiss National Supercomputing Centre
  - DOE SLAC
  - Ohio State
  - Mississippi State
  - RPI

Basics of Visualization

```
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0265700 144210 056426 044700 042650 165230 137037 003655 006254
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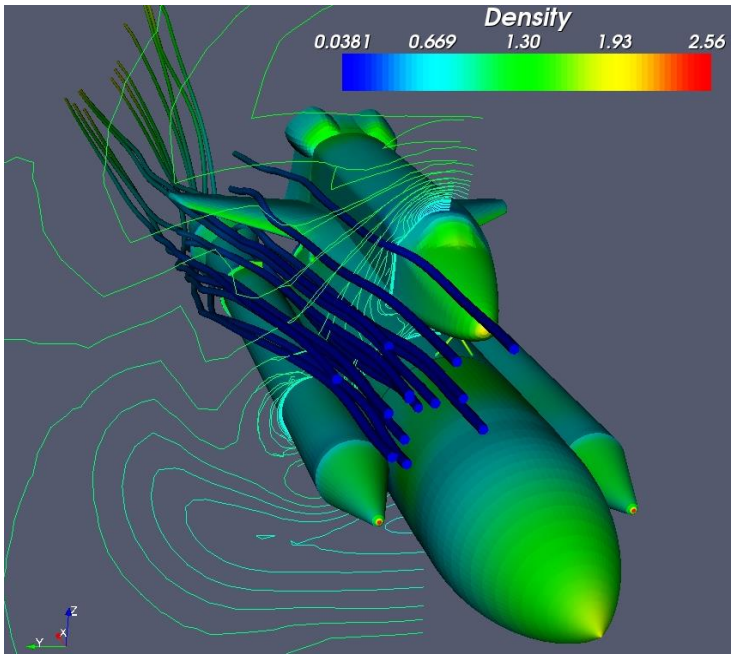
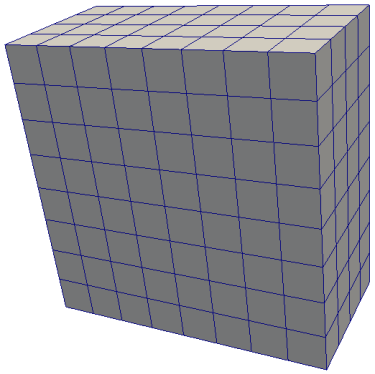
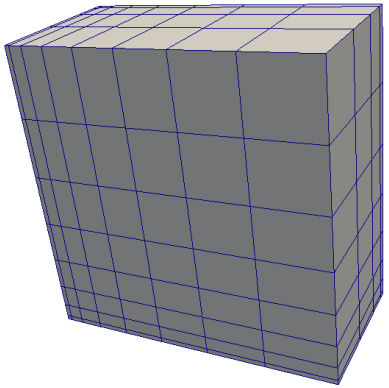


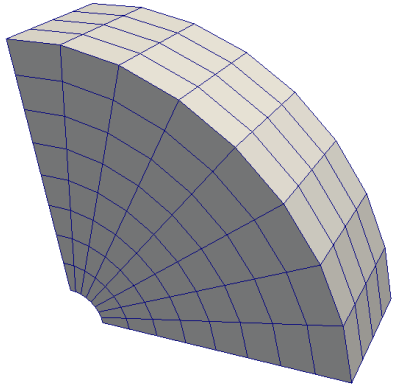
Data Types



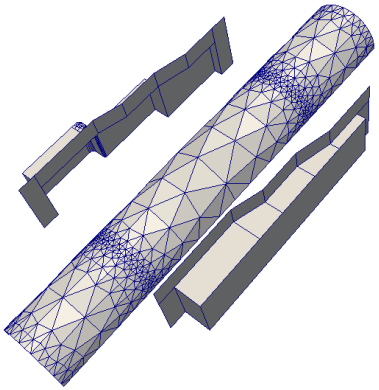
Uniform Rectilinear
(vtkImageData)



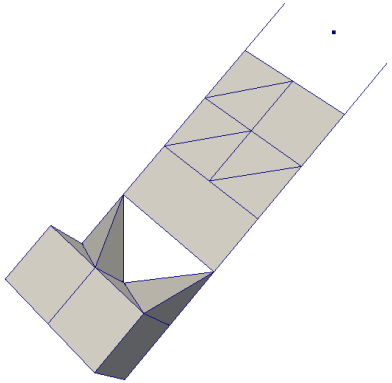
Non-Uniform Rectilinear
(vtkRectilinearData)



Curvilinear
(vtkStructuredData)



Polygonal
(vtkPolyData)



Unstructured Grid
(vtkUnstructuredGrid)

Multi-block

Hierarchical Adaptive Mesh Refinement (AMR)

Hierarchical Uniform AMR

Octree

Publications

Referencing ParaView

If you are working with ParaView and need to formally reference it, please use one of the following:

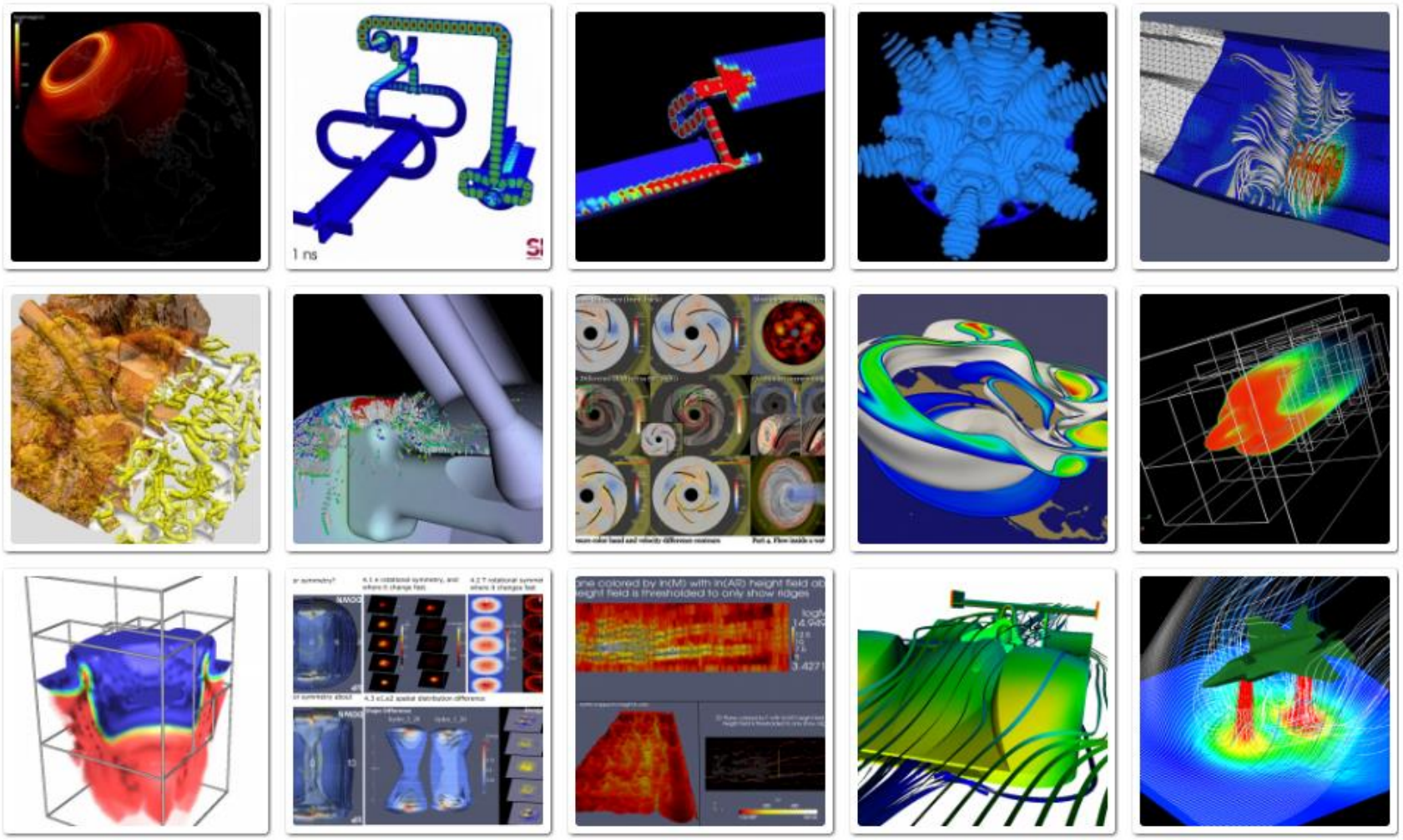
- Ahrens, James, Geveci, Berk, Law, Charles, *ParaView: An End-User Tool for Large Data Visualization*, Visualization Handbook, Elsevier, 2005, ISBN-13: 978-0123875822
- Ayachit, Utkarsh, *The ParaView Guide: A Parallel Visualization Application*, Kitware, 2015, ISBN 978-1930934306

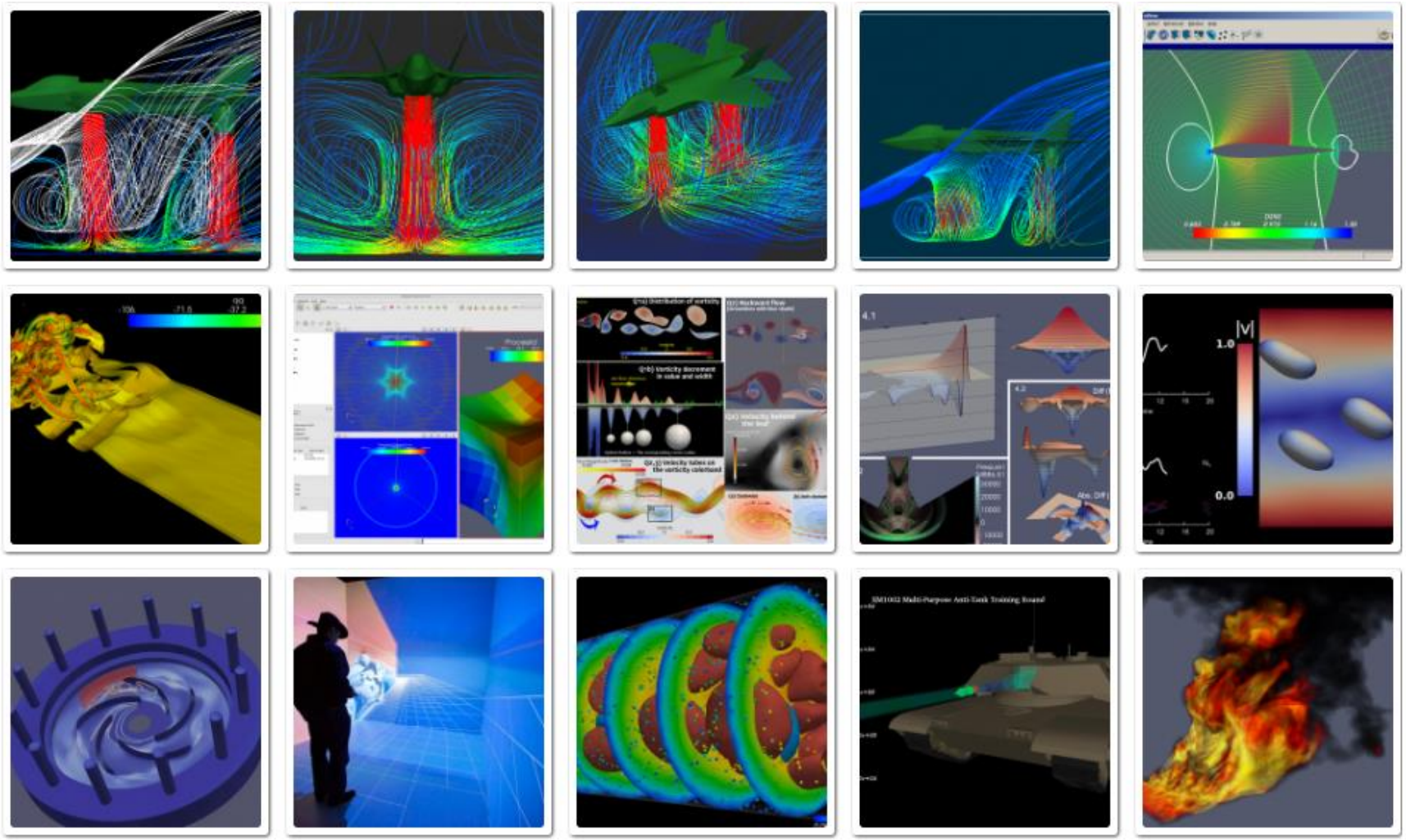
Recent ParaView Publications

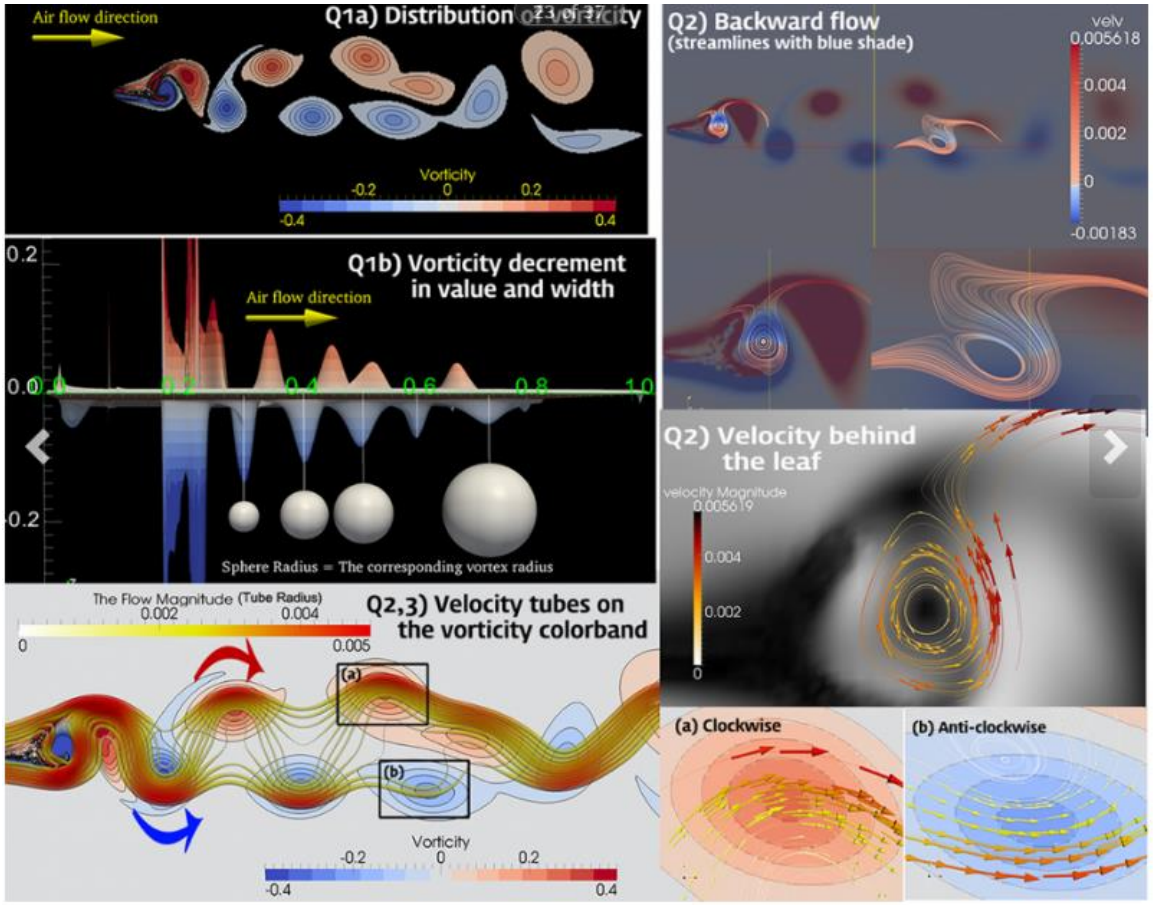
As an active open-source project, ParaView is well represented in recent publications. The list below represents a sample of recent publications.

- Nov-2014. James Ahrens, Sébastien Jourdain, Patrick O'Leary, John Patchett, David H Rogers, Mark Petersen. *An image-based approach to extreme scale in situ visualization and analysis*, Proceedings of the International Conference for High Performance Computing.
- Oct-2014. Woodring J., Ahrens J., Tautges T., Peterka T., Vishwanath V., Geveci B., *On-demand unstructured mesh translation for reducing memory pressure during in situ analysis*, UltraVis '13 Proceedings of the 8th International Workshop on Ultrascale Visualization.
- Oct-2014. Karimabadi H., Loring B., O'Leary P., Majumdar A., Tatineni M., Geveci B., *In-situ visualization for global hybrid simulations*, Proceedings of the Conference on Extreme Science and Engineering Discovery Environment: Gateway to Discovery.
- June-2014. Karimabadi H., Roytershteyn V., Vu H.X., Omelchenko Y.A., Scudder J., Daughton W., Dimmock A., Nykyri K., Wan M., Sibeck D., Tatineni M., Majumdar A., Loring B., Geveci B., *The link between shocks, turbulence, and magnetic reconnection in collisionless plasmas*, Physics of Plasmas, AIP Publishing.
- Dec-2013, Nouanesengsy B., Patchett J., Ahrens J., Bauer A., Chaudhary A., Miller R., Geveci B., M Shipman G., N Williams D., *A model for optimizing file access patterns using spatio-temporal parallelism*, Proceedings of the 8th International Workshop on Ultrascale Visualization.
- Sep-2013. DeMarle D., Geveci B., Ahrens J., Woodring J., *Streaming and Out-of-Core methods*, High Performance Visualization: Enabling Extreme Scale Scientific Insight, CRC Press

http://www.paraview.org/gallery/

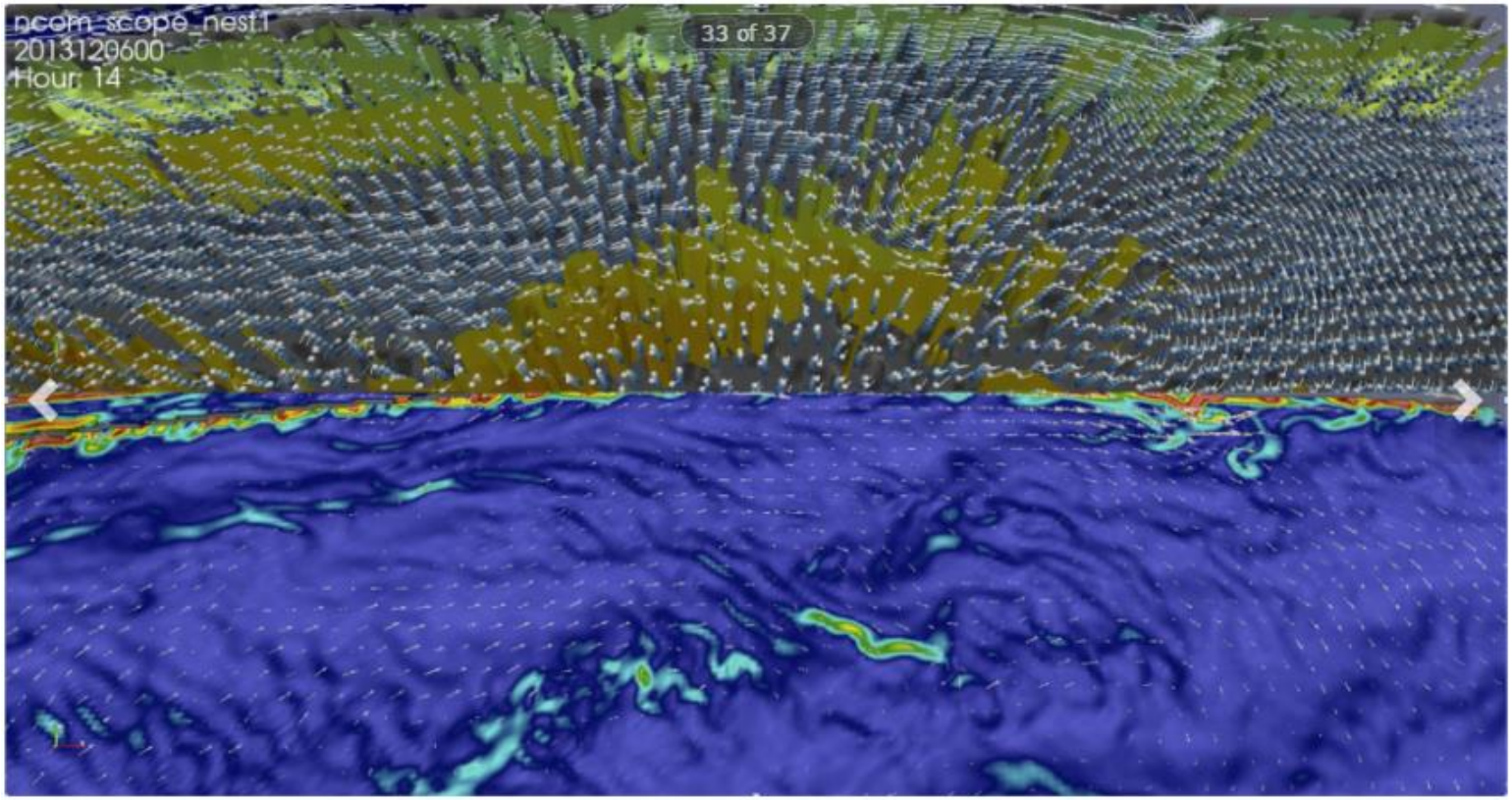






Simulation of airflow around a leaf, showing how both the leaf and the flow respond to vortices shed by the leaf.

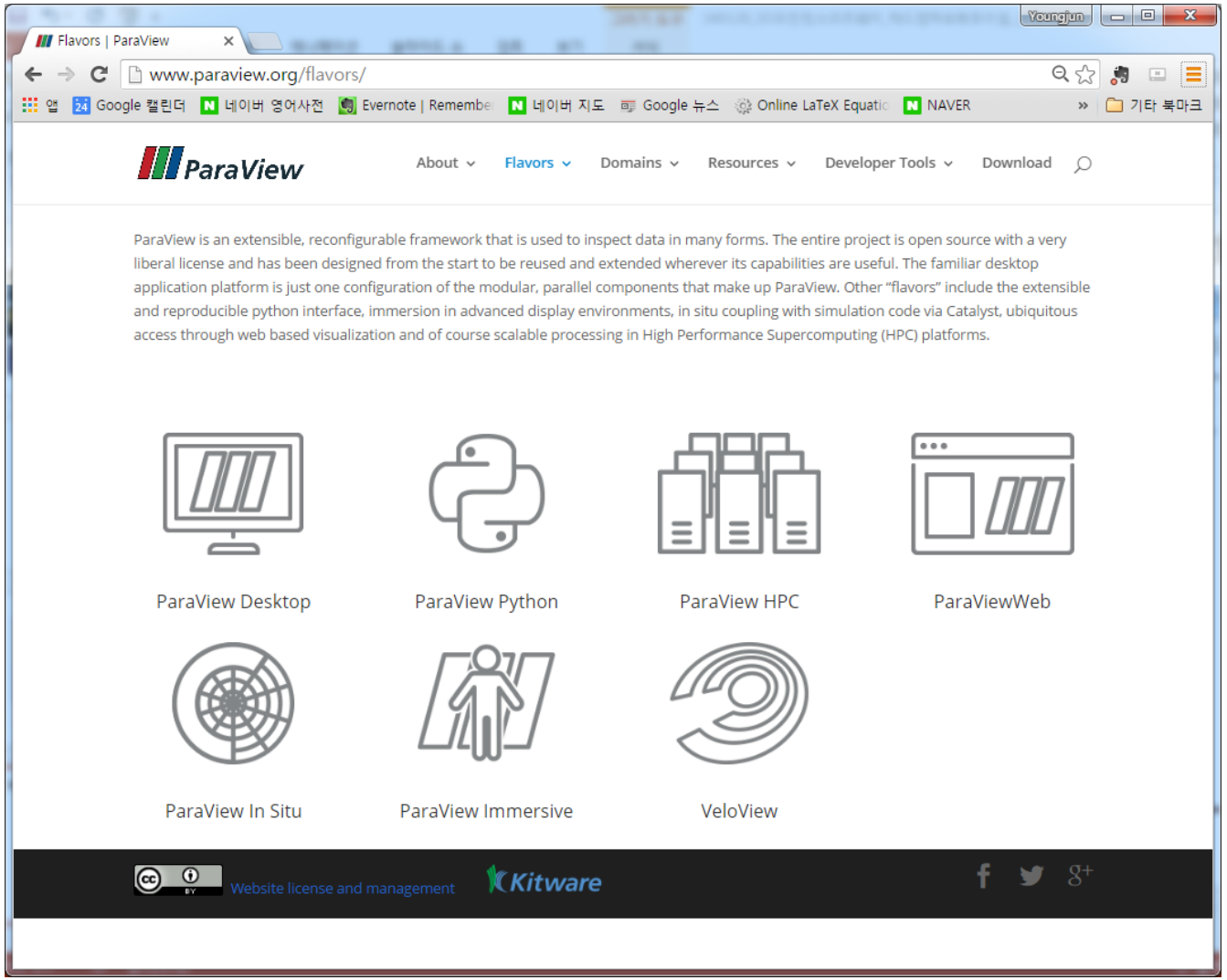
ParaView was recently used in Russell Taylor's Comp 715: Visualization in the Sciences class at the University of North Carolina at Chapel Hill. Author: Joo Hwi Lee and Namdi Brandon Copyright: Data courtesy of Laura Miller, UNC Applied Mathematics



NCOM

Visualization of Navy Coast Ocean Model data showing both internal and surface flow.

Image curtesy Sean Ziegler at DoD HPCMP PETTT for the Naval Research Laboratory. The model is being coupled with wave and atmospheric models. It is producing true 3D features in the shape of "donuts" that appear both in temperature and current velocity fields. The features' effect upon the velocity is more important, but the temperature gradients seem to show the features in better detail, so we found a way to show both. Then the oceanographers can correlate the locations/sizes of the features to the current velocity effects to determine if they are true physical phenomena or some artifact of the model coupling.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ParaView is an extensible, reconfigurable framework that is used to inspect data in many forms. The entire project is open source with a very liberal license and has been designed from the start to be reused and extended wherever its capabilities are useful. The familiar desktop application platform is just one configuration of the modular, parallel components that make up ParaView. Other "flavors" include the extensible and reproducible python interface, immersion in advanced display environments, in situ coupling with simulation code via Catalyst, ubiquitous access through web based visualization and of course scalable processing in High Performance Supercomputing (HPC) platforms.
ParaView Desktop
ParaView Python
ParaView HPC
ParaViewWeb
ParaView In Situ
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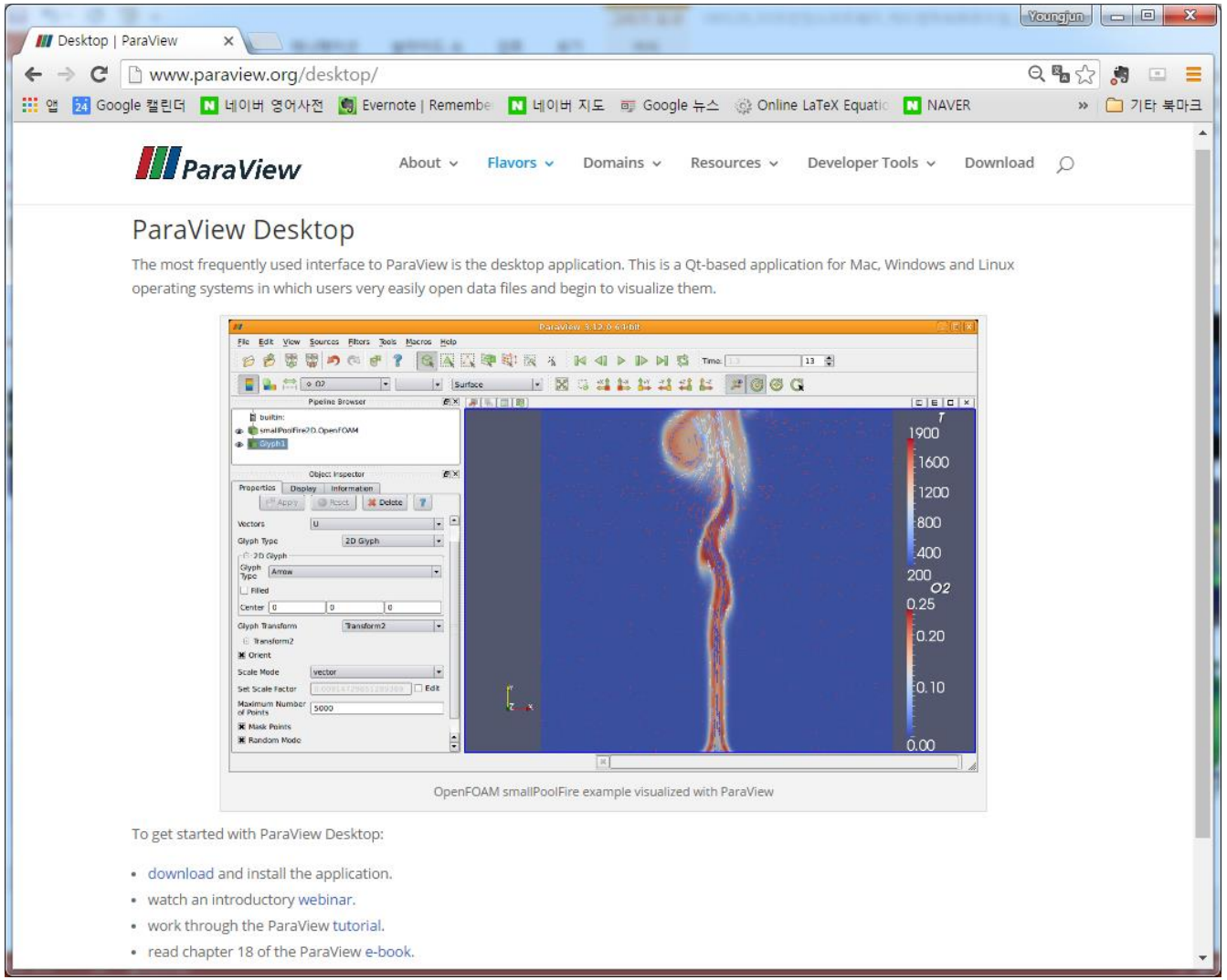
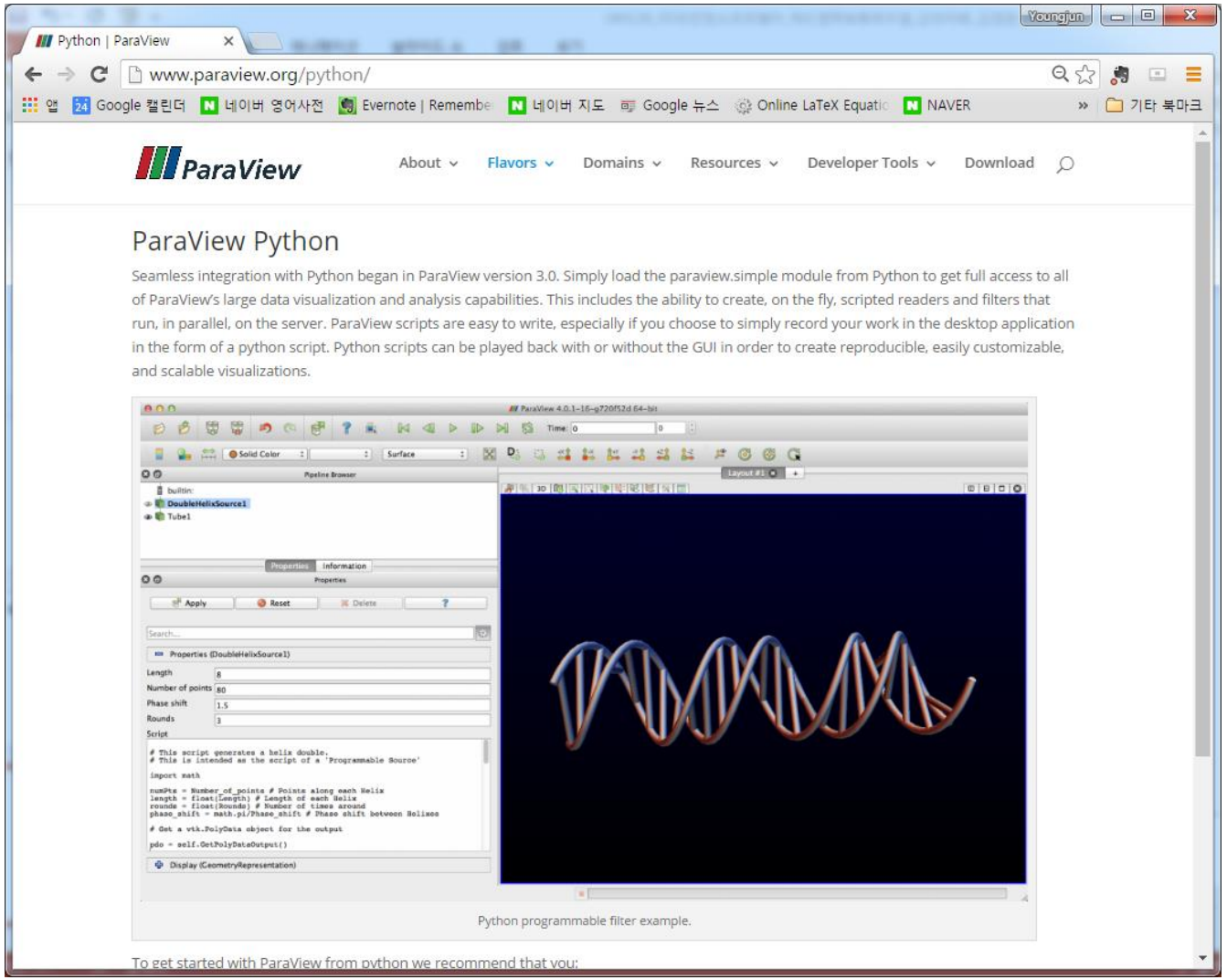


http://www.paraview.org/python/



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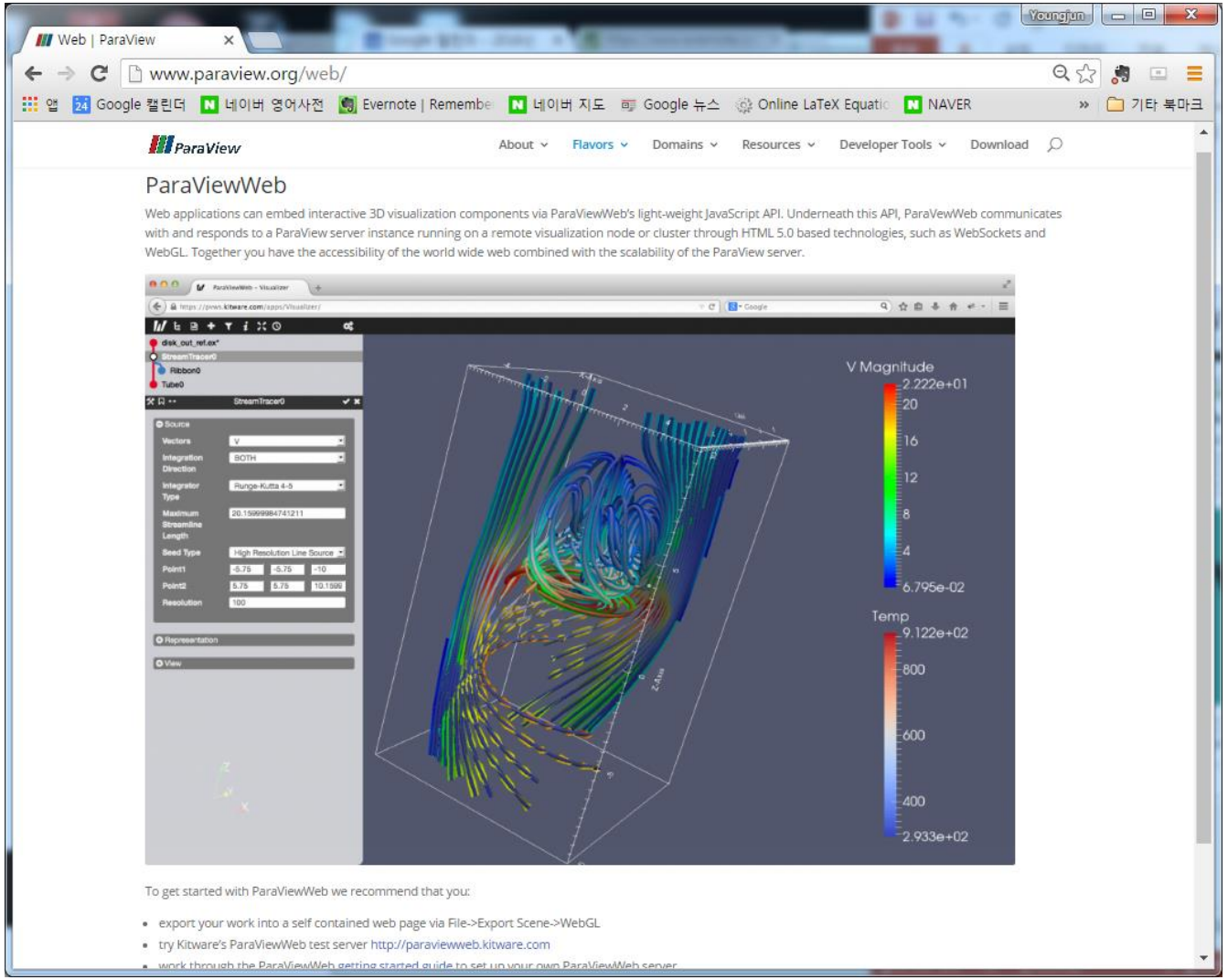

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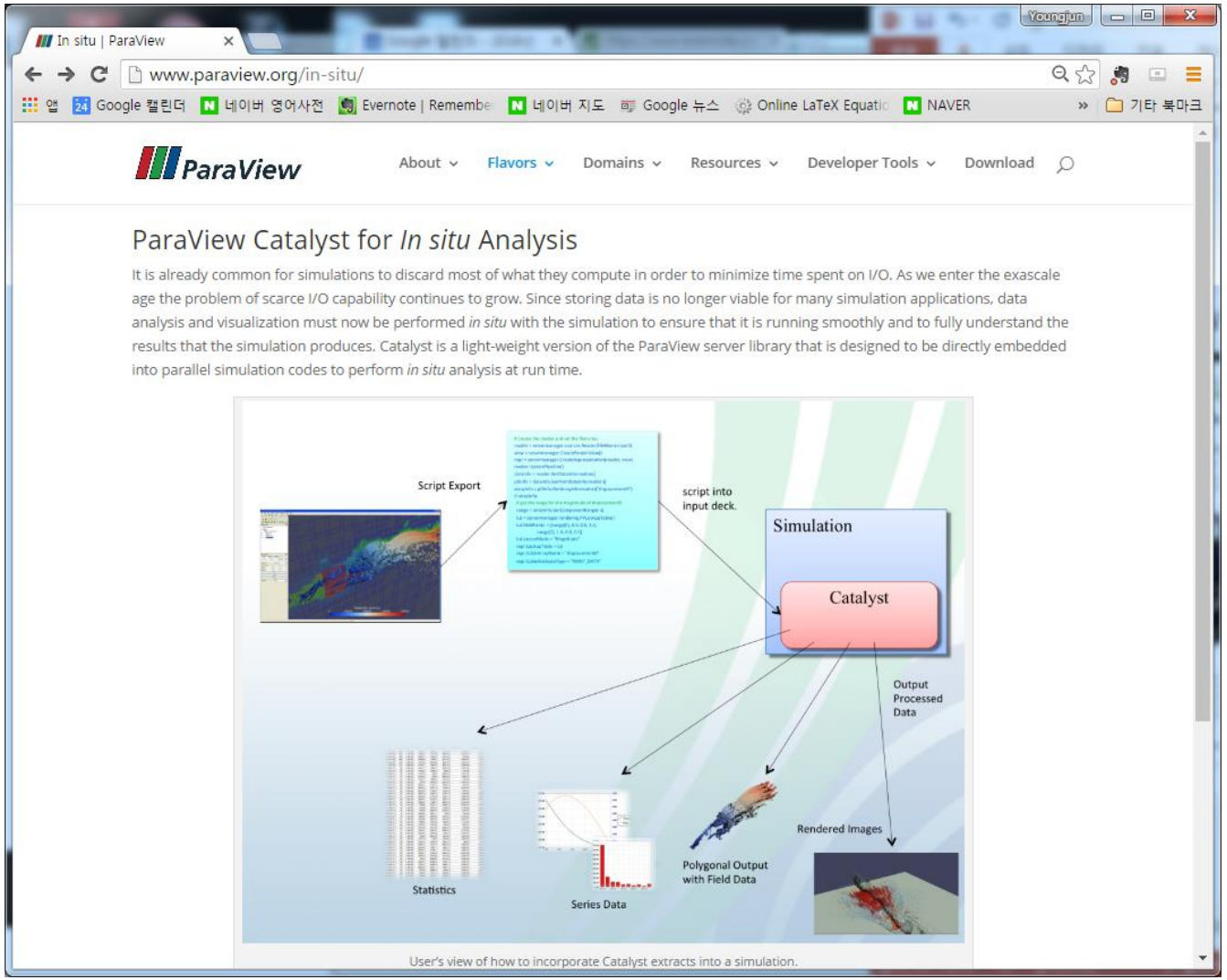

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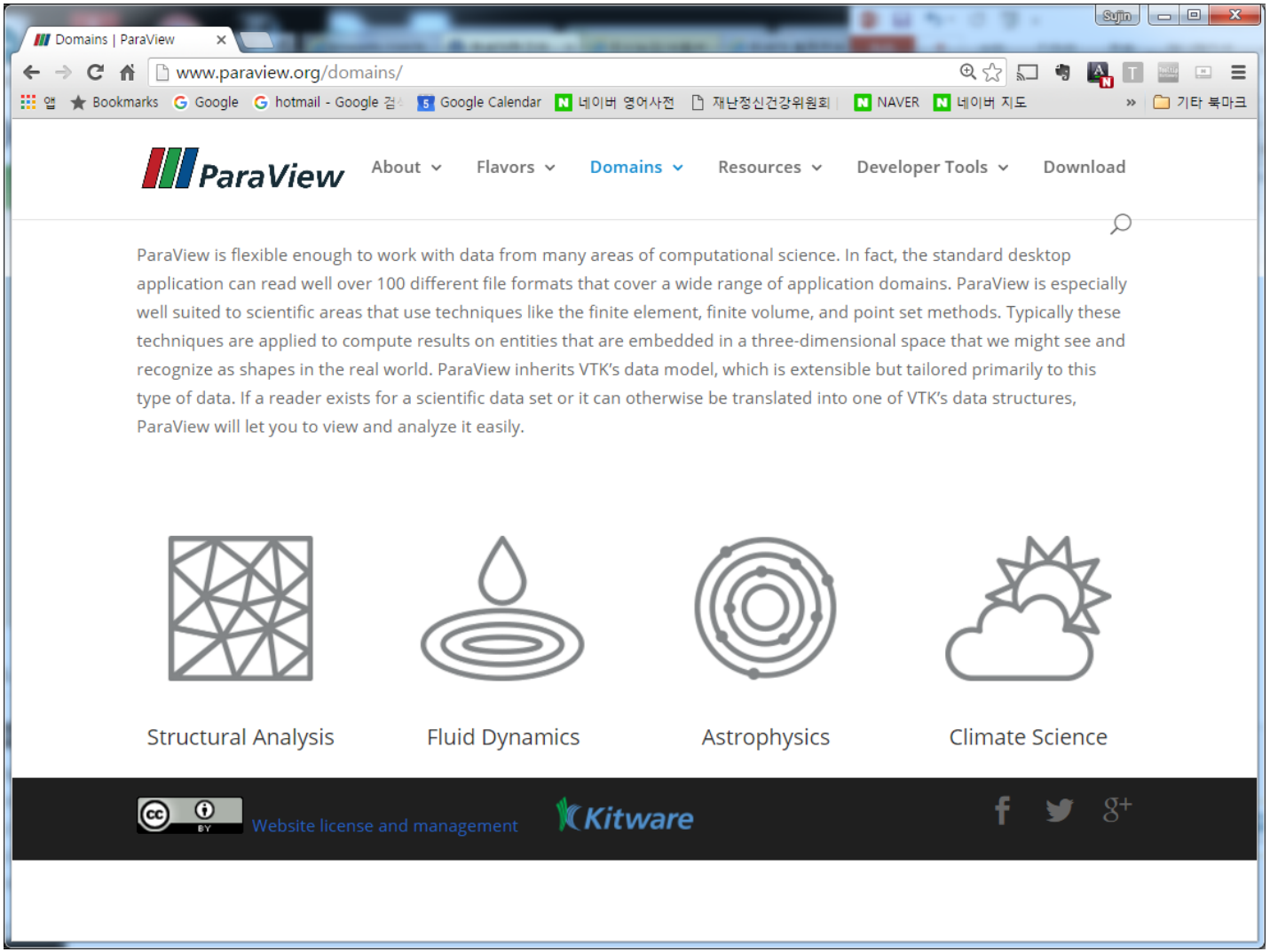
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ParaView is flexible enough to work with data from many areas of computational science. In fact, the standard desktop application can read well over 100 different file formats that cover a wide range of application domains. ParaView is especially well suited to scientific areas that use techniques like the finite element, finite volume, and point set methods. Typically these techniques are applied to compute results on entities that are embedded in a three-dimensional space that we might see and recognize as shapes in the real world. ParaView inherits VTK's data model, which is extensible but tailored primarily to this type of data. If a reader exists for a scientific data set or it can otherwise be translated into one of VTK's data structures, ParaView will let you to view and analyze it easily.
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Get the ParaView Guide!

The ParaView Guide is the official user's manual and reference guide for ParaView. There are several ways of obtaining the latest version of the ParaView Guide.

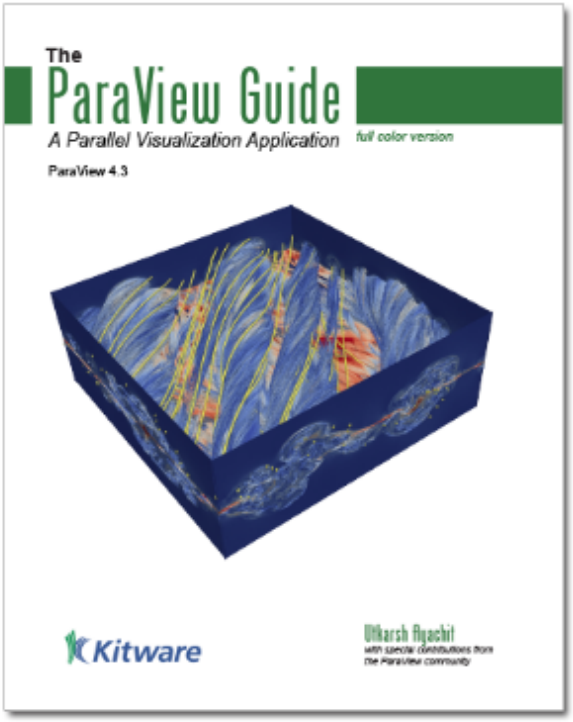
Community Edition (CE)

The ParaView Guide (CE) is distributed as a free download in PDF form here. The LaTeX source files used to generate the PDF for the ParaView Guide (CE) are released under CC BY 4.0 and are available here.

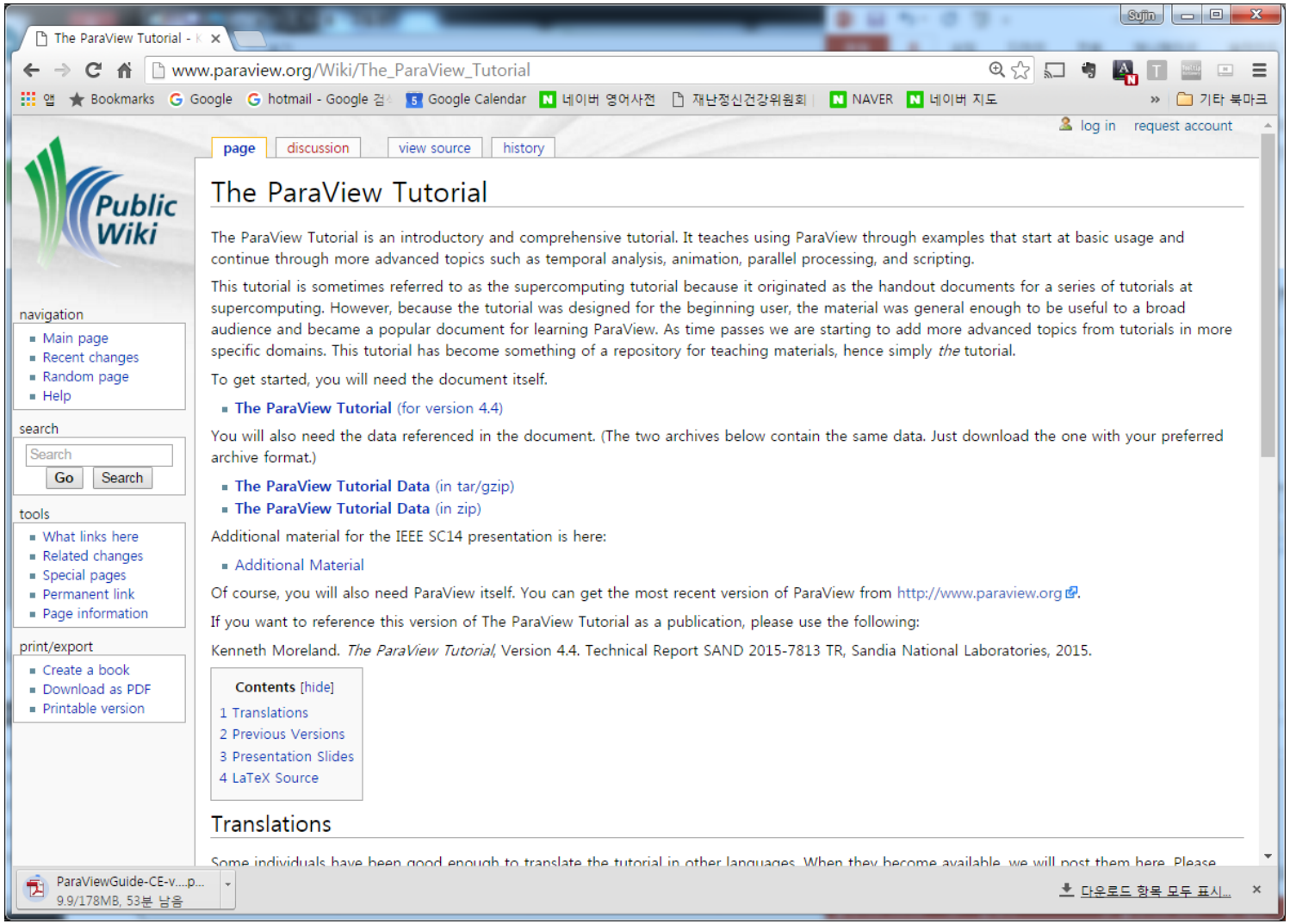
Printed Editions

The ParaView Guide is offered in two print versions: our standard version (ISBN 978-1930934290) and a full color version (ISBN 978-1930934306). Both versions are available through various US and international Amazon sites.

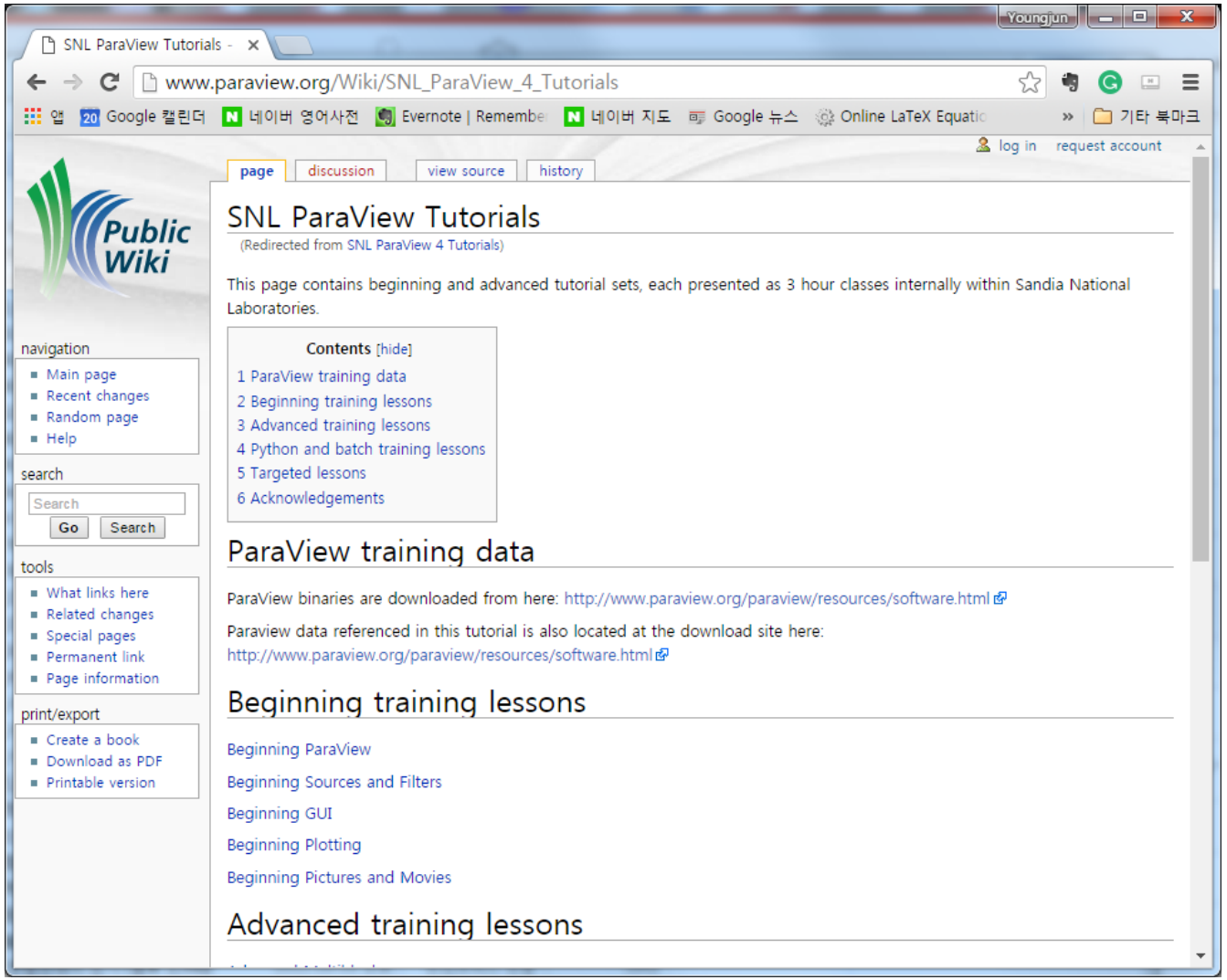
In addition to the chapters in the community edition, the printed versions include 3 extra chapters that cover using ParaView for CFD analysis, AMR processing, and case-studies.



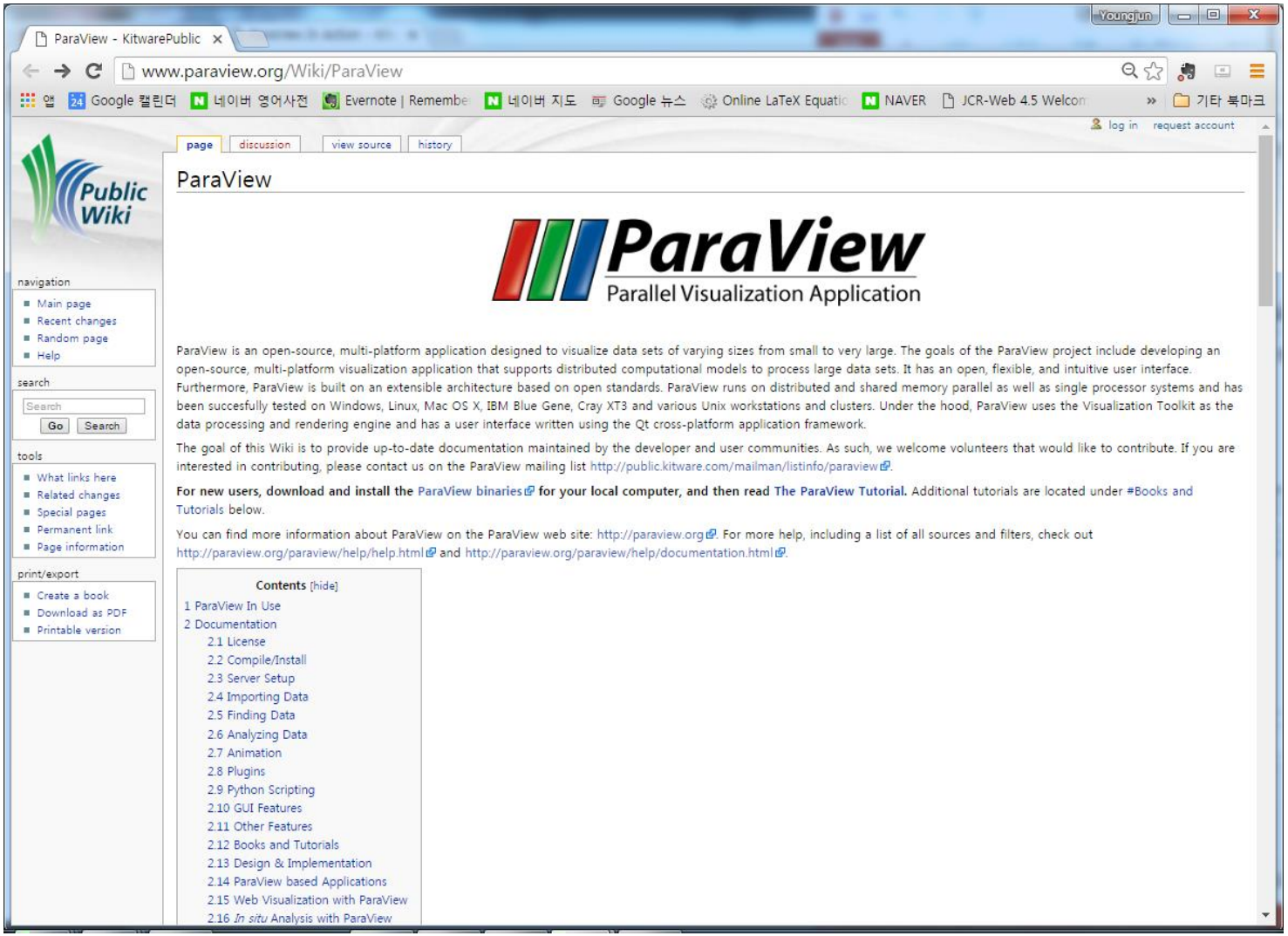
http://www.paraview.org/Wiki/The_ParaView_Tutorial



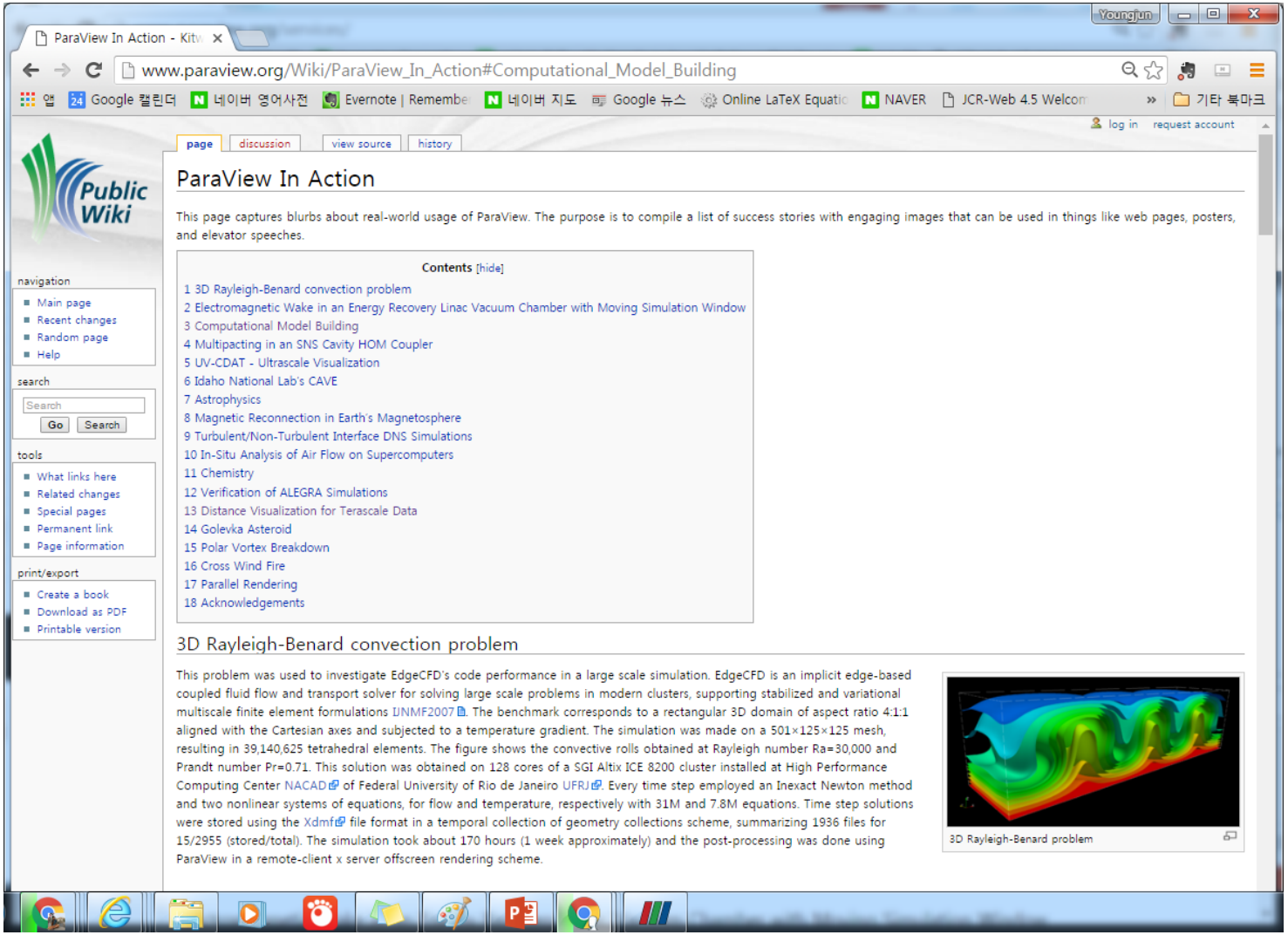
SNL ParaView Tutorials
http://www.paraview.org/Wiki/SNL_ParaView_4_Tutorials



ParaView Wiki
http://www.paraview.org/Wiki/ParaView



http://www.paraview.org/Wiki/ParaView_In_Action#Computational_Model_Building



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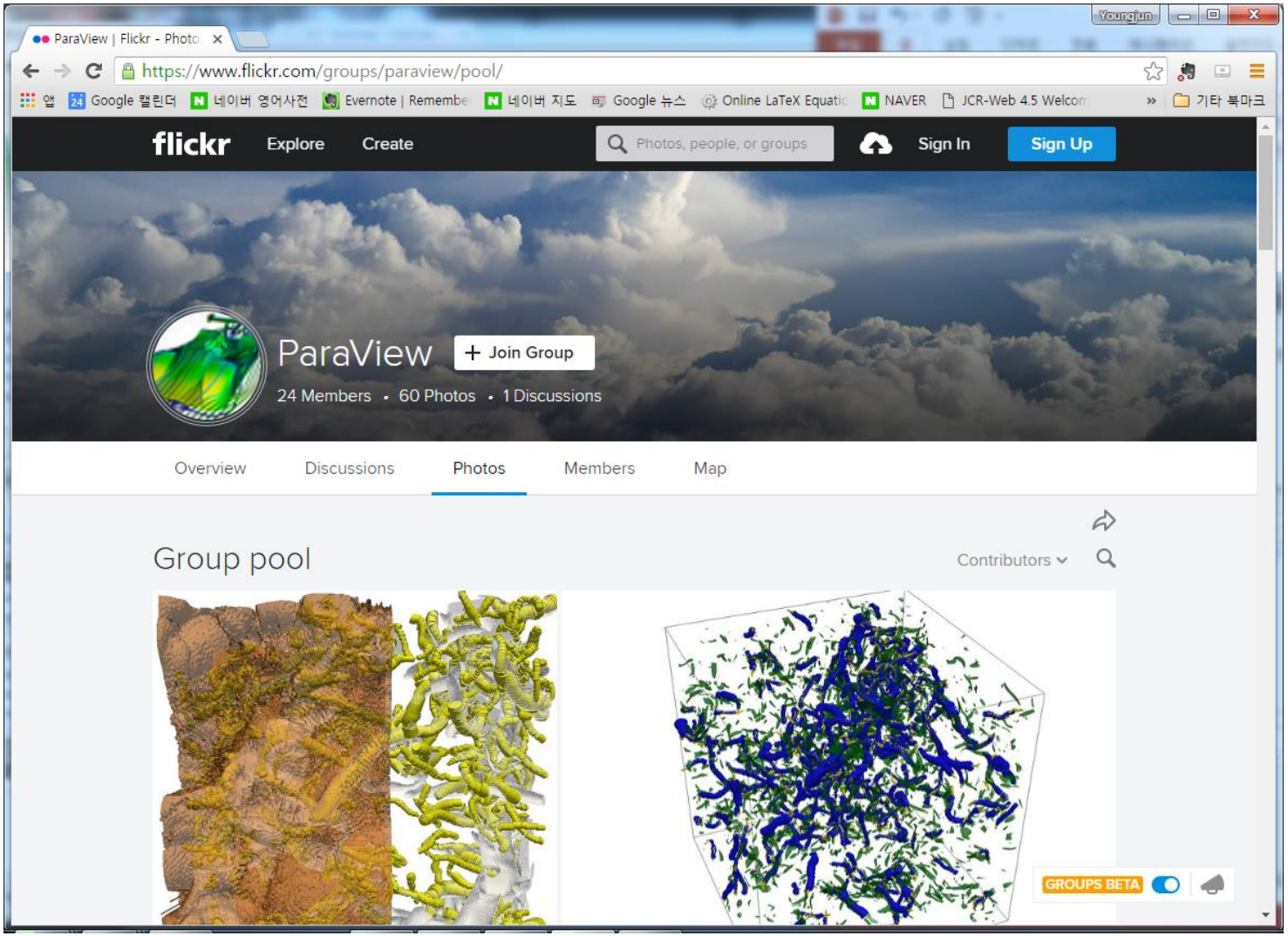

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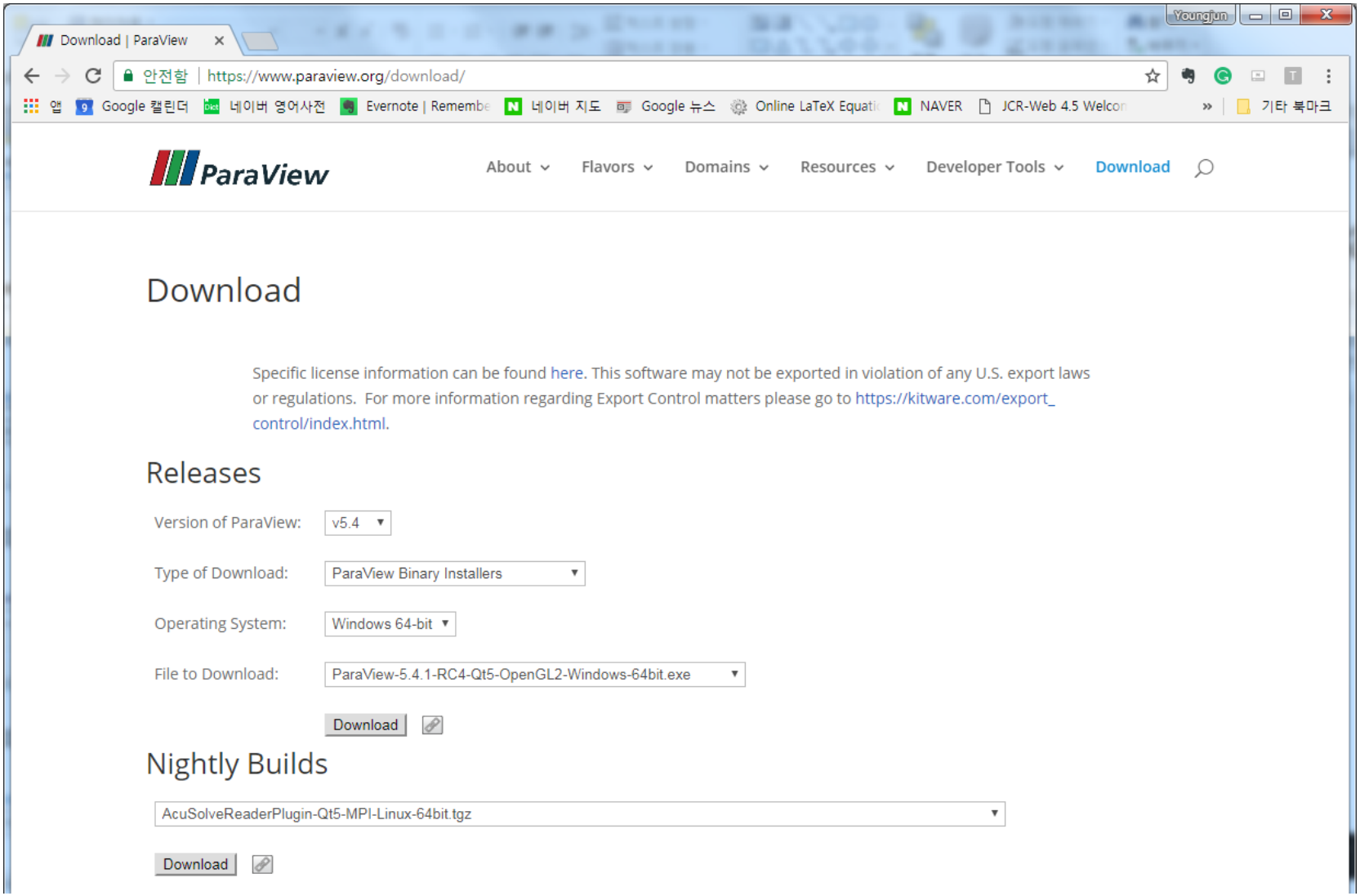

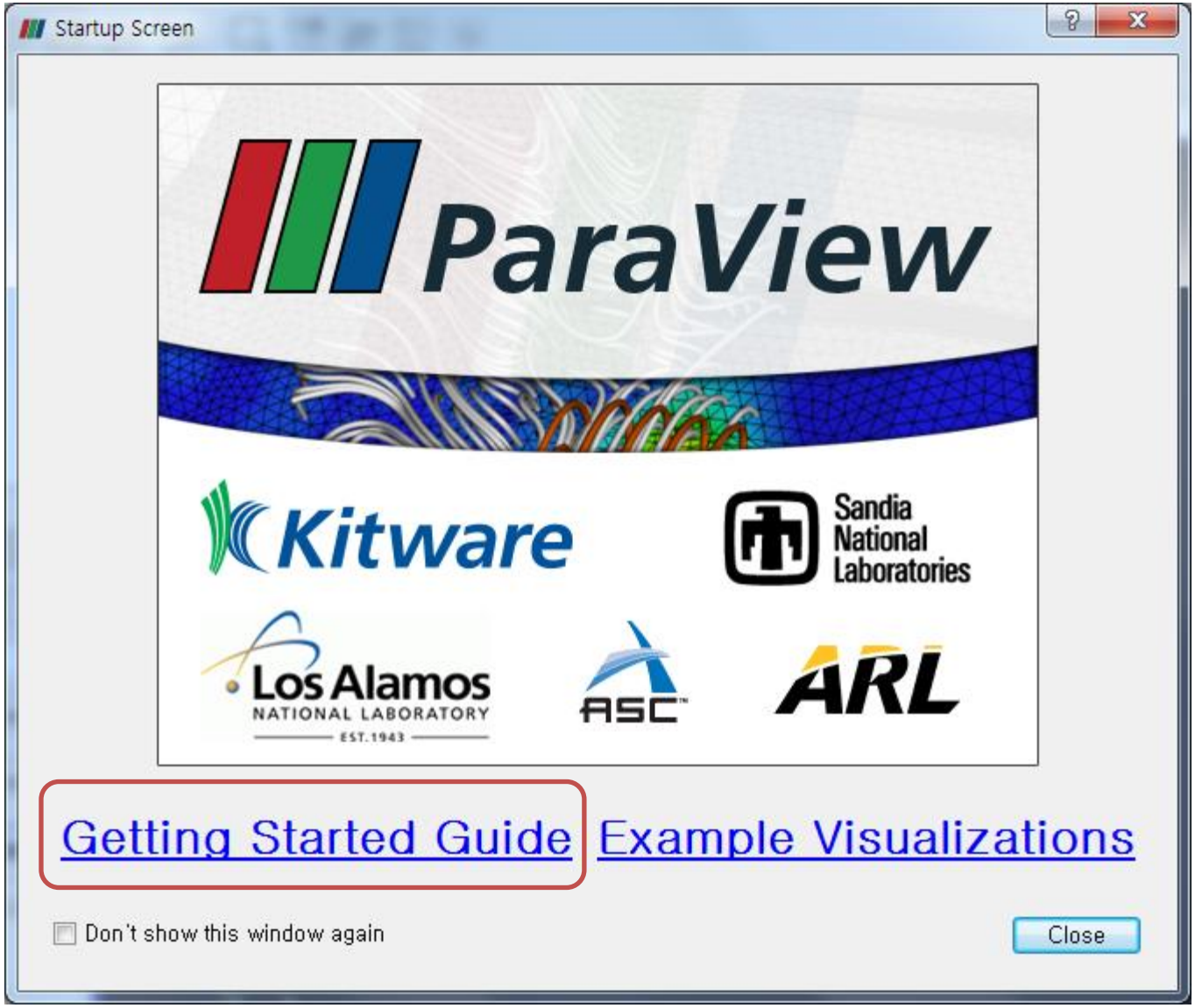
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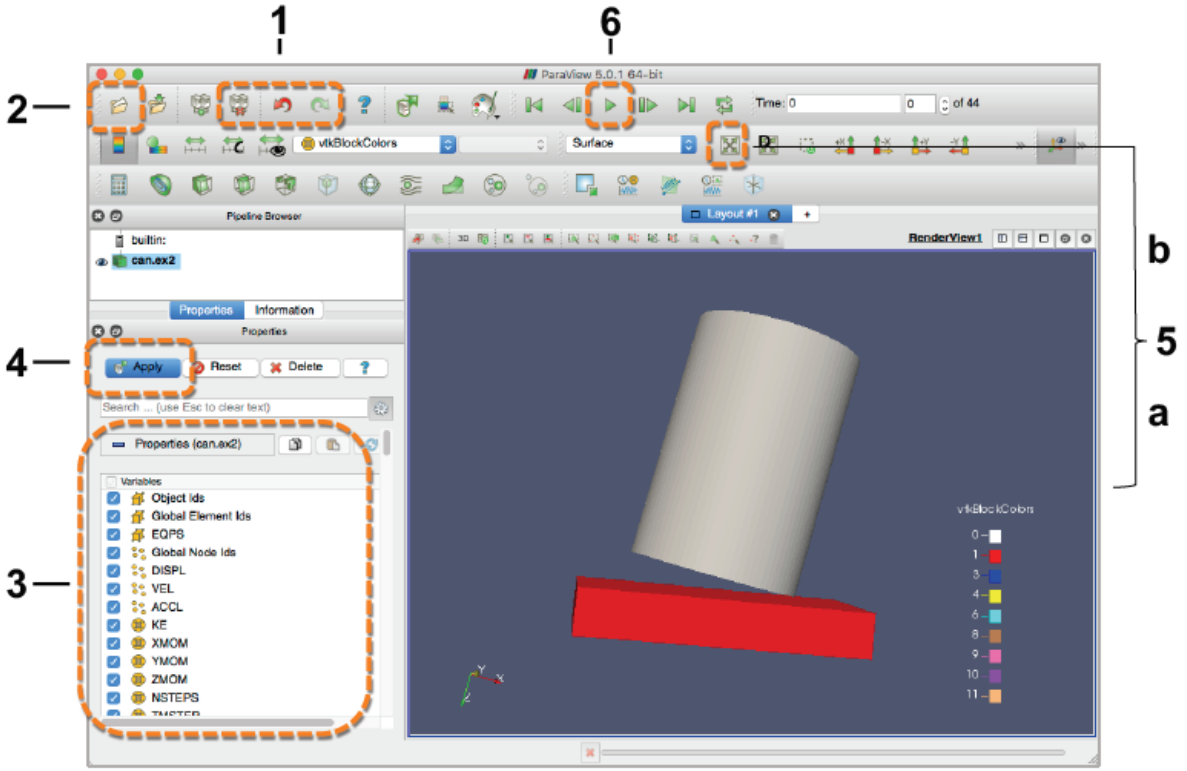
Close

ParaView Getting Started Guide

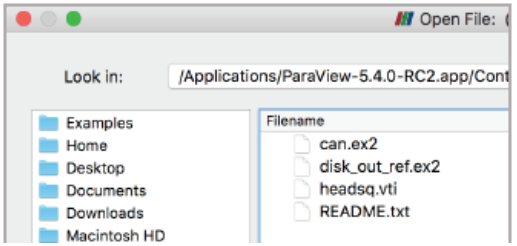


Reset Session

1 At any time, click to reset ParaView to its initial state when the program is first started. The **Undo** and **Redo** buttons are also available to undo/redo individual changes.

Open File

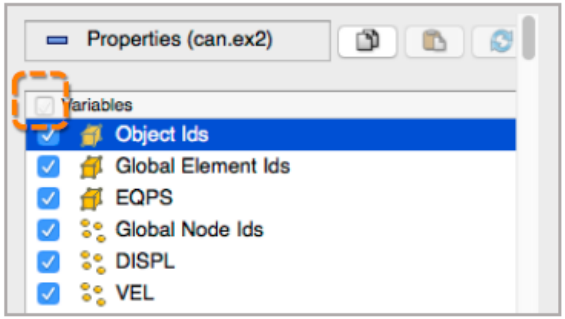
2 Click the folder icon or choose **File -> Open**. From the **Examples** directory, open the file **can.ex2**. Doing so creates a **file reader** in the **Pipeline Browser**.



3

Select Data Variables

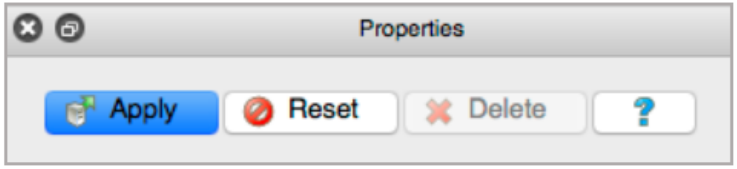
Before the data are loaded, you can choose which variables to load in the **Properties** panel (lower left, ParaView window). Click the checkbox next to **Variables** to load all variables. Note: many controls in ParaView are located in this panel.



4

Apply Data

Click the **Apply** button to load the data. If you change any file reader properties, click **Apply** to update the visualization.

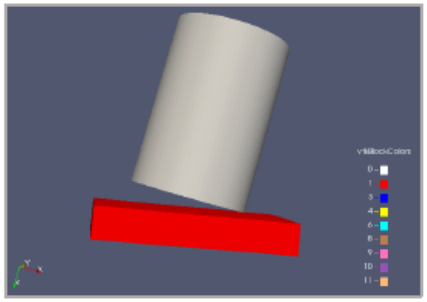


5

Interact with 3D View

a. Click the left mouse button and drag to rotate, the middle mouse button to translate, and the scroll wheel or right mouse button to zoom. For one- or two-button mice, hold down Shift and Control keys while clicking and dragging to tilt, translate, and zoom.

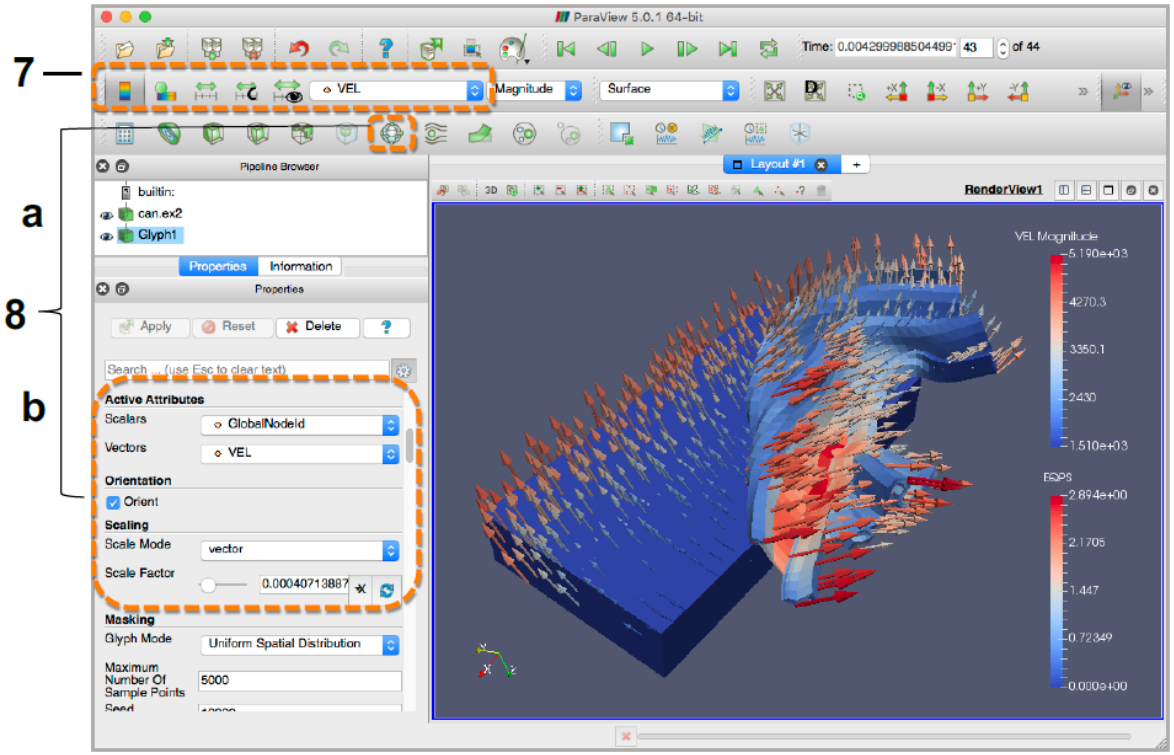
b. To re-center the data in the view, click  .



6

Animate the Data

Press the play button and watch the can get crushed. Other buttons enable moving to different timesteps.



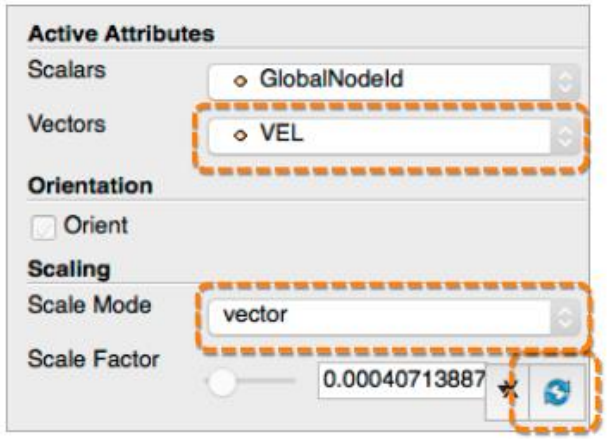
Apply a Color Map to a Variable

7 Click on the drop-down menu in the variables toolbar and select the **EQPS** variable.

Add Vector Glyphs

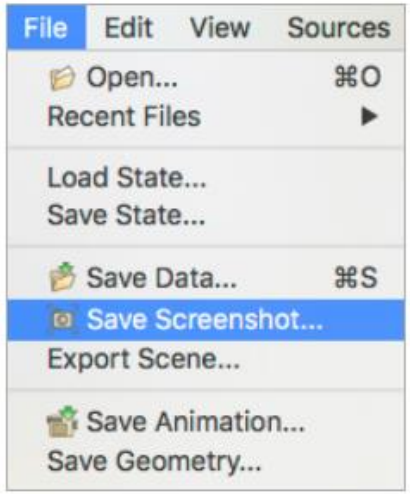
a. Ensure **can.ex2** is selected in the **Pipeline Browser**. Click the **Glyph** filter icon in the toolbar to add a **filter** to the pipeline that will add arrow glyphs to the visualization.

8 **b.** In the **Properties** panel under **Active Attributes**, choose **VEL** from the **Vectors** property menu. Change the **Scale Mode** to **vector**. Click to rescale the vectors to an appropriate length. Click **Apply** to update the visualization. Use the variables toolbar to color the glyphs by **VEL** (see previous step).



Save Screenshot

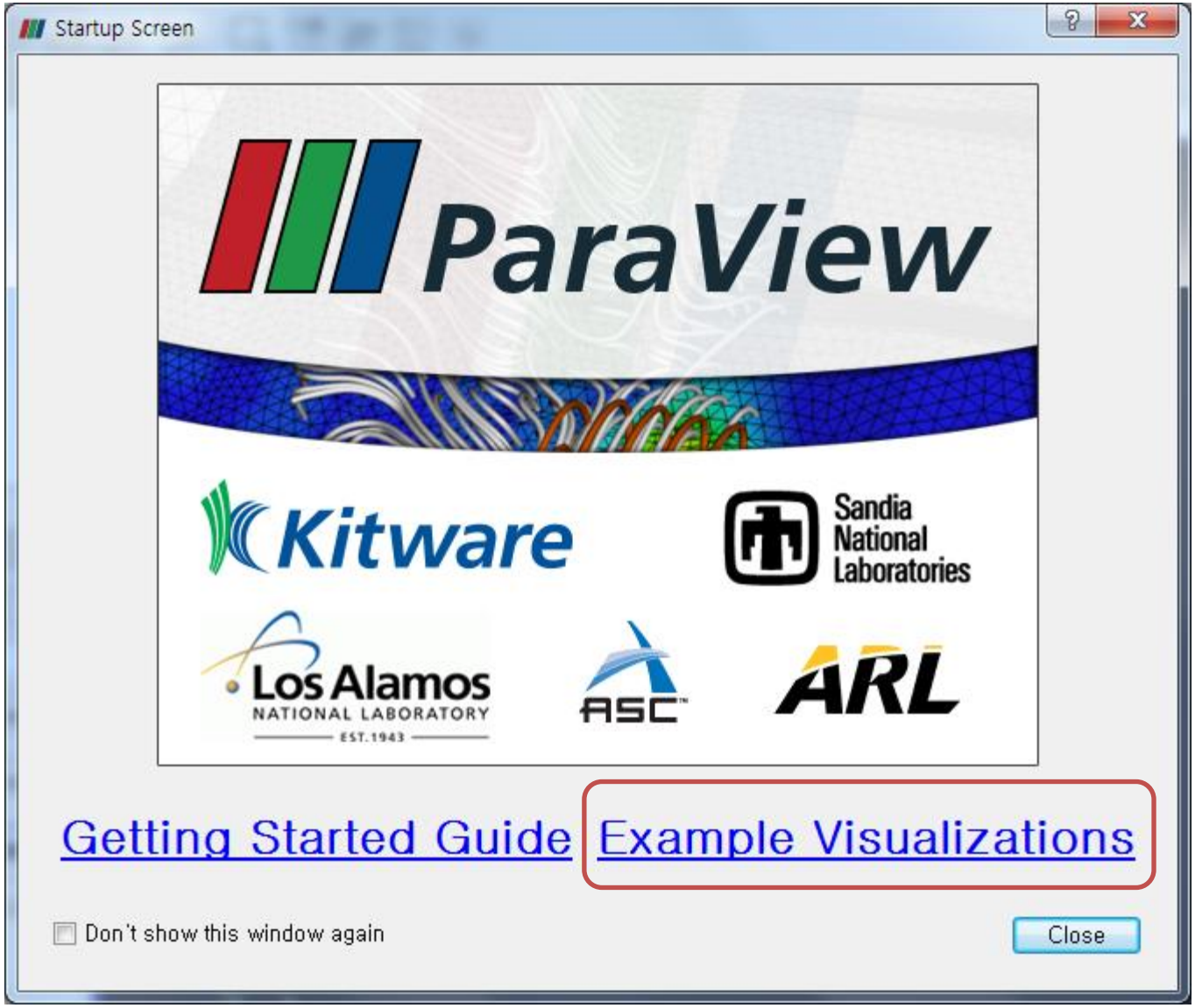
Save an image for presentation or publication by choosing **File -> Save Screenshot…**

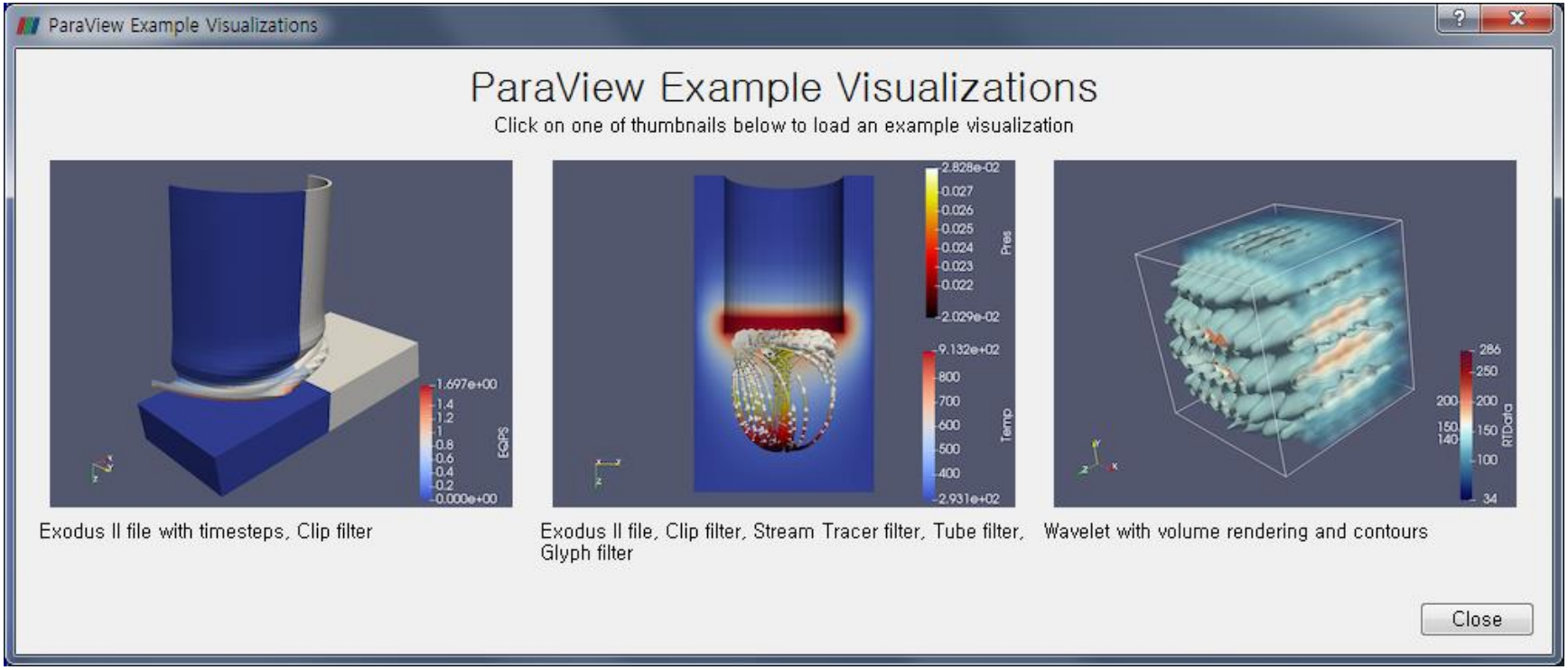


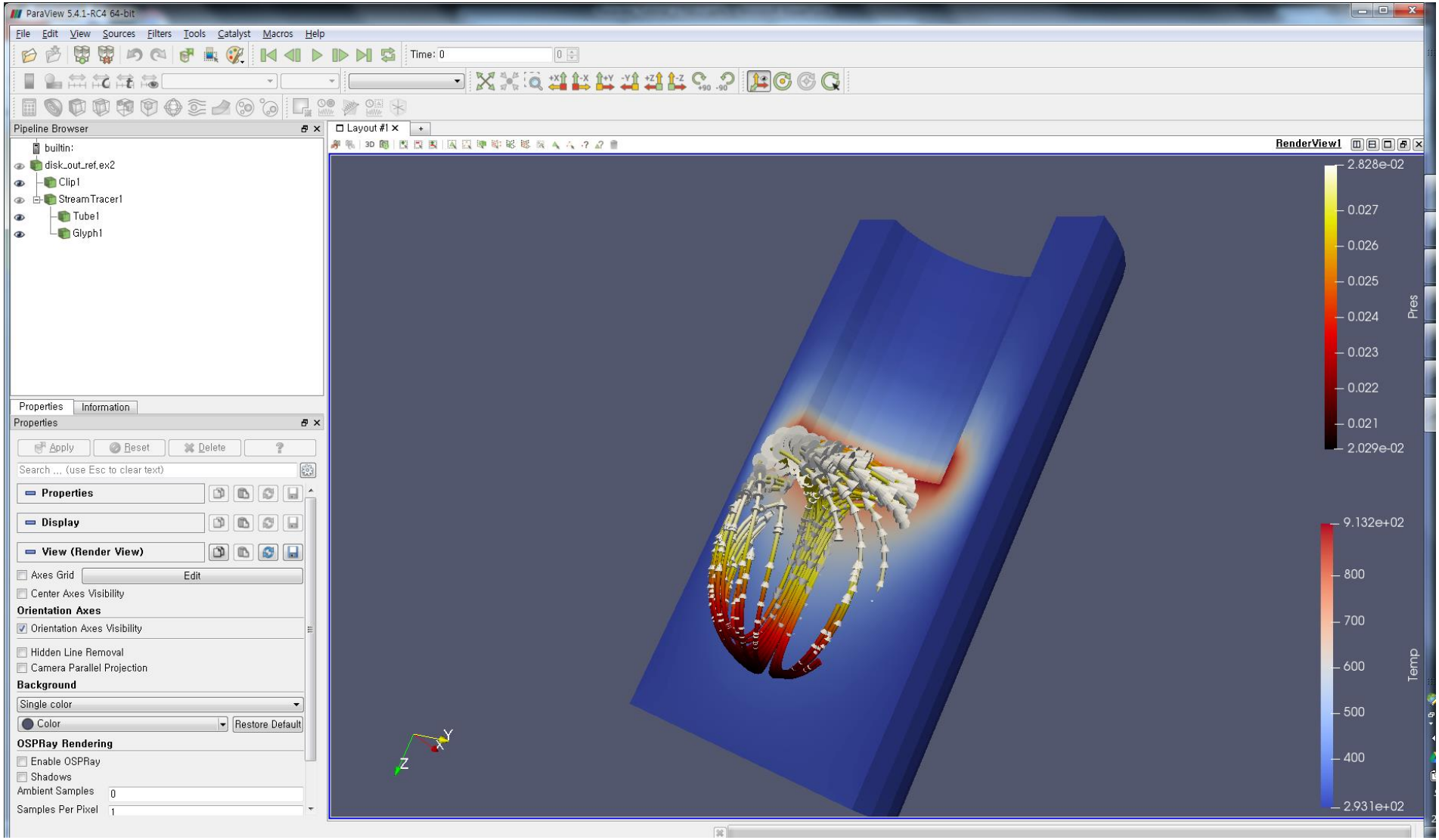
Get Additional Help

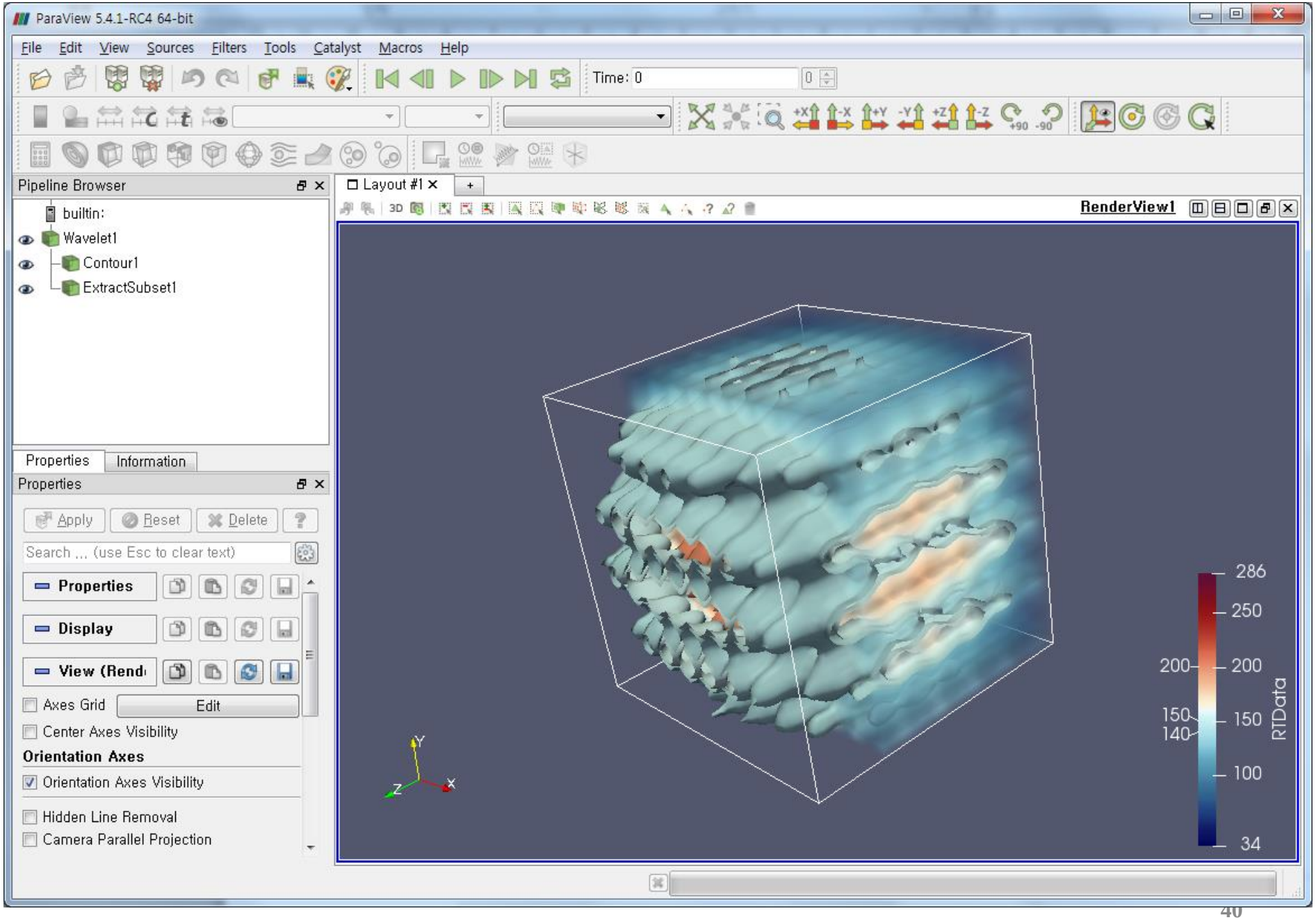
Additional resources for learning about **ParaView** are available in the **Help** menu.

- **ParaView Guide** – comprehensive user guide for ParaView
- **Help** – online help for file readers and filters
- **Online Tutorials** – in-depth tutorials for ParaView
- **Online Blogs** – informative blog posts on new features in ParaView


Startup Screen
ParaView
Kitware
Sandia National Laboratories
Los Alamos NATIONAL LABORATORY EST.1943
ASC
ARL
Getting Started Guide
Example Visualizations
Don't show this window again
Close


ParaView Example Visualizations
ParaView Example Visualizations
Click on one of thumbnails below to load an example visualization
1.697e+00
1.4
1.2
1
0.8
0.6
0.4
0.2
0.000e+00
EQPS
Exodus II file with timesteps, Clip filter
2.828e-02
0.027
0.026
0.025
0.024
0.023
0.022
2.029e-02
Pres
9.132e+02
800
700
600
500
400
2.931e+02
Temp
Exodus II file, Clip filter, Stream Tracer filter, Tube filter, Glyph filter
286
250
200
150
100
34
RTData
Wavelet with volume rendering and contours
Close


ParaView 5.4.1-RC4 64-bit
File Edit View Sources Filters Tools Catalyst Macros Help
Time: 0
Pipeline Browser
builtin:
disk_out_ref.ex2
Clip1
StreamTracer1
Tube1
Glyph1
Properties Information
Properties
Apply Reset Delete
Search ... (use Esc to clear text)
Properties
Display
View (Render View)
Axes Grid Edit
Center Axes Visibility
Orientation Axes
Orientation Axes Visibility
Hidden Line Removal
Camera Parallel Projection
Background
Single color
Color Restore Default
OSPRay Rendering
Enable OSPRay
Shadows
Ambient Samples 0
Samples Per Pixel 1
Layout #1
RenderView1
2.828e-02
0.027
0.026
0.025
0.024
0.023
0.022
0.021
2.029e-02
Pres
9.132e+02
800
700
600
500
400
2.931e+02
Temp
Y
Z


ParaView 5.4.1-RC4 64-bit
File Edit View Sources Filters Tools Catalyst Macros Help
Time: 0
Pipeline Browser
builtin:
Wavelet1
Contour1
ExtractSubset1
Properties Information
Properties
Apply Reset Delete
Search ... (use Esc to clear text)
Properties
Display
View (Rend
Axes Grid Edit
Center Axes Visibility
Orientation Axes
Orientation Axes Visibility
Hidden Line Removal
Camera Parallel Projection
Layout #1
RenderView1
286
250
200
200
150
150
140
100
34
RTData
Y
Z
X

Large Scale Visualization with ParaView

Supercomputing 2014 Tutorial

November 16, 2014

Kenneth Moreland
W. Alan Scott
Sandia National Laboratories

Sebastien Jourdain
David DeMarle
Robert Maynard
Kitware, Inc.

La-Ta Lo
Los Alamos National Laboratory

Joseph Insley
Argonne National Laboratory

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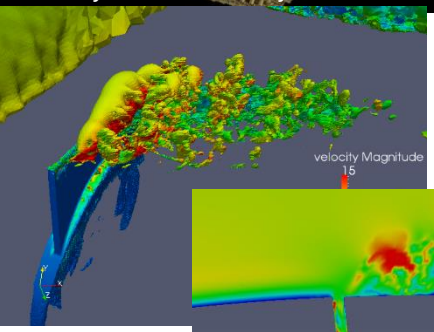
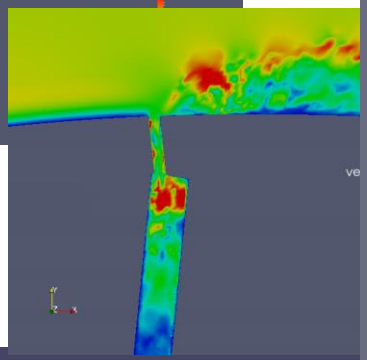
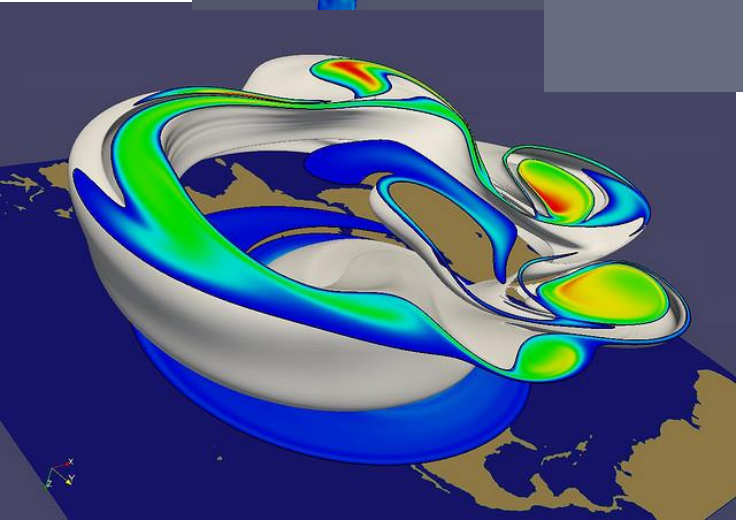
SAND 2014-17514 PE

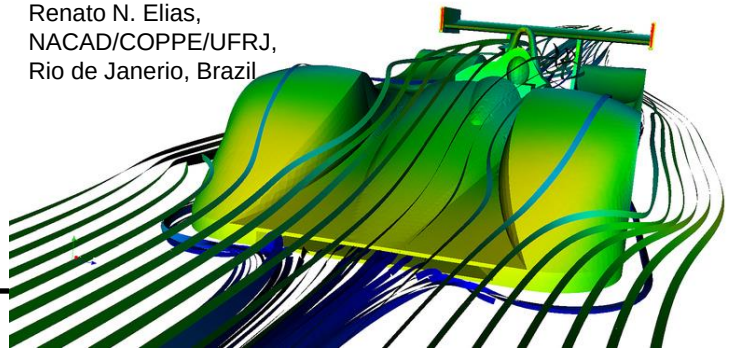
Jerry Clarke, US Army Research Laboratory

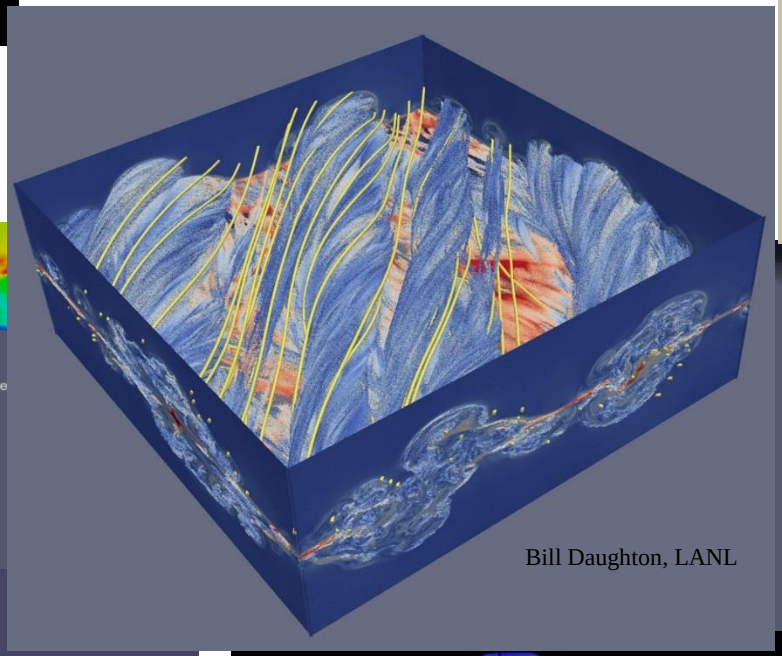




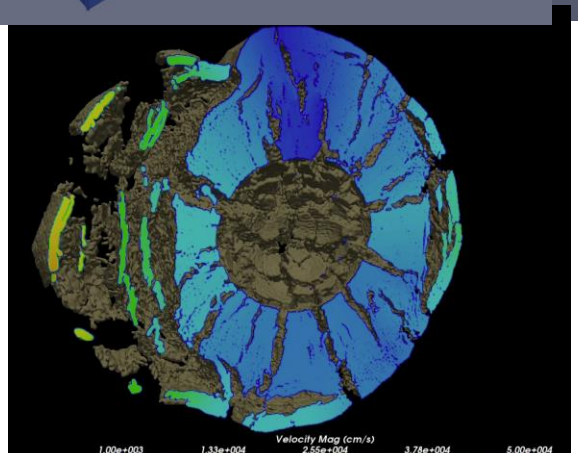


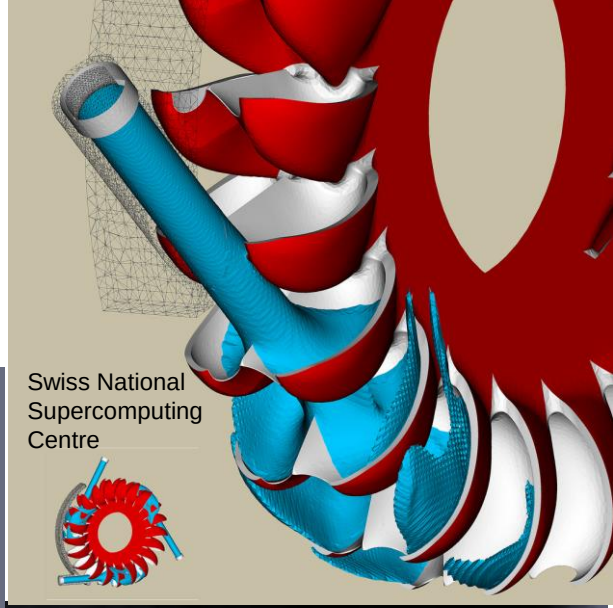
Renato N. Elias,
NACAD/COPPE/UFRJ,
Rio de Janerio, Brazil



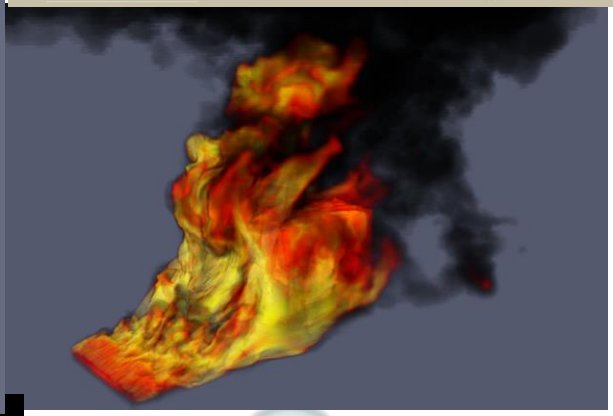


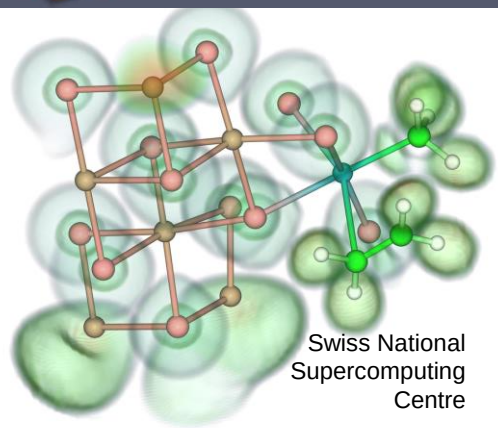
Bill Daughton, LANL





Swiss National
Supercomputing
Centre





Swiss National
Supercomputing
Centre

Basic Usage

User Interface

Menu Bar

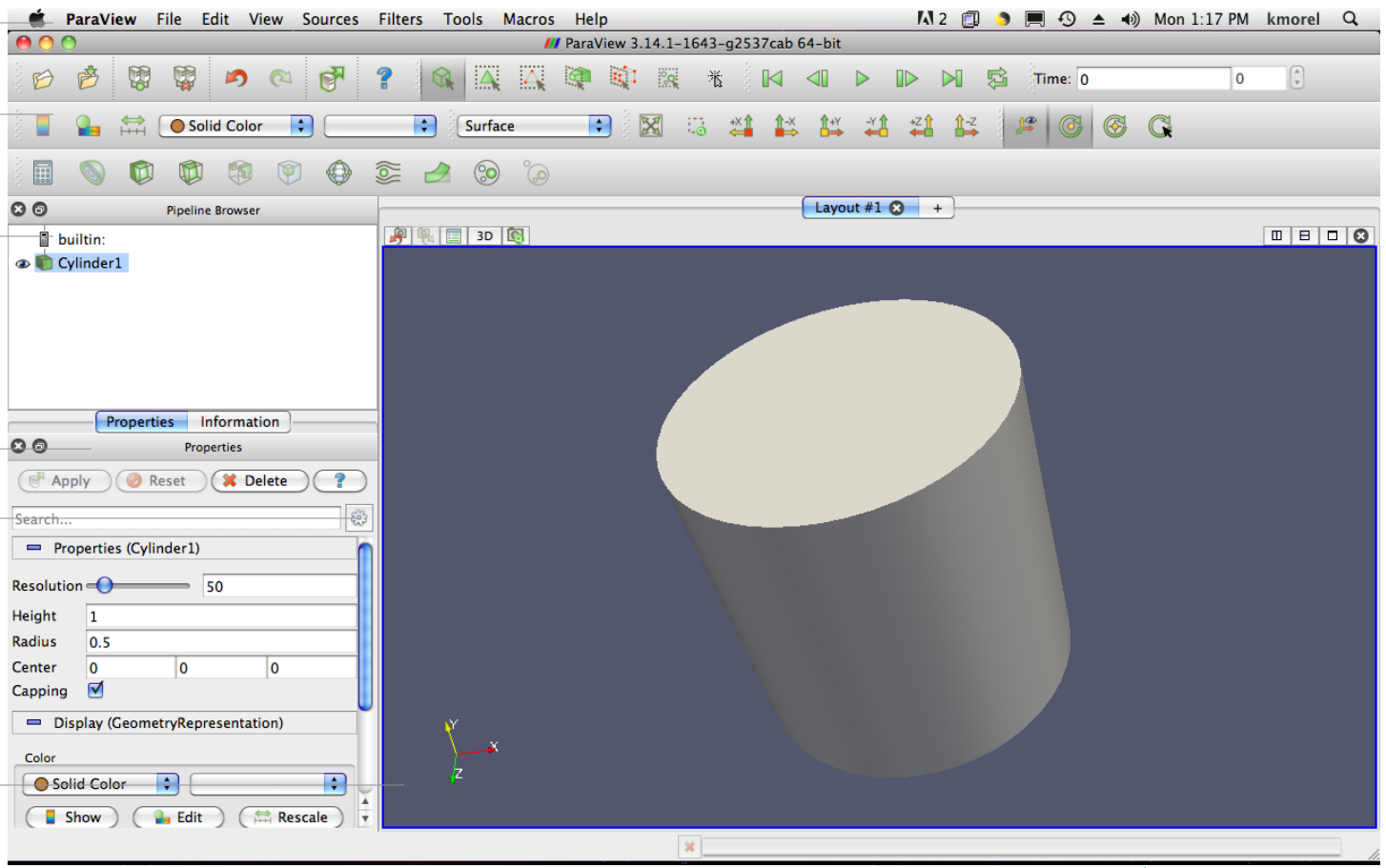
Toolbars

Pipeline Browser

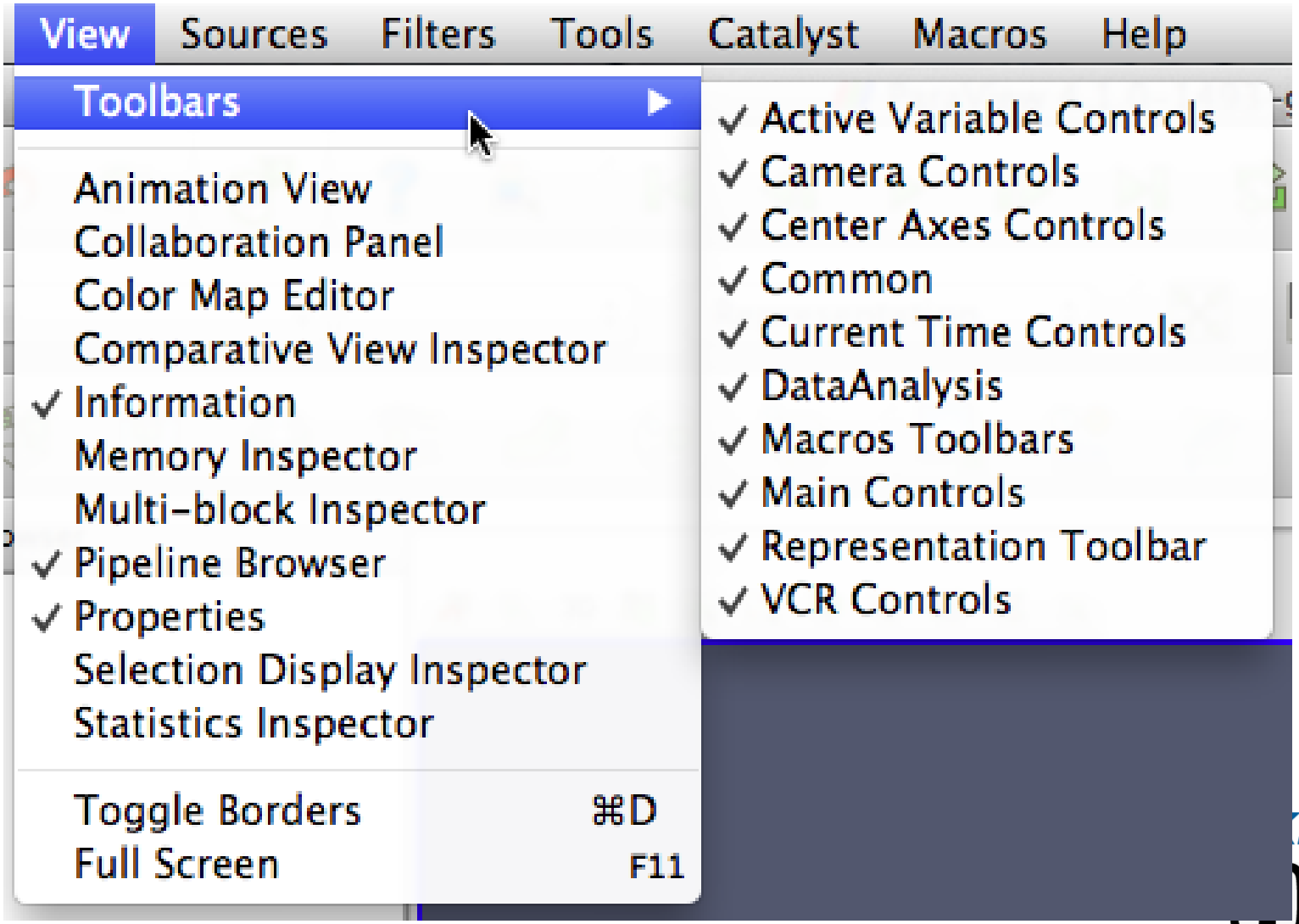
Properties Panel

Advanced Toggle

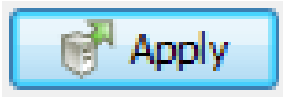
3D View



Getting Back GUI Components



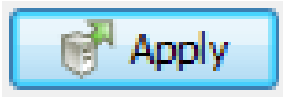
Creating a Cylinder Source

1. Go to the Source menu and select Cylinder.
2. Click the Apply button to accept the default parameters. 

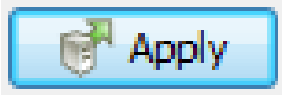
Simple Camera Manipulation

- Drag left, middle, right buttons for rotate, pan, zoom.
  - Also use Shift, Ctrl, Alt modifiers.

Creating a Cylinder Source

1. Go to the Source menu and select Cylinder.
2. Click the Apply button to accept the default parameters. 

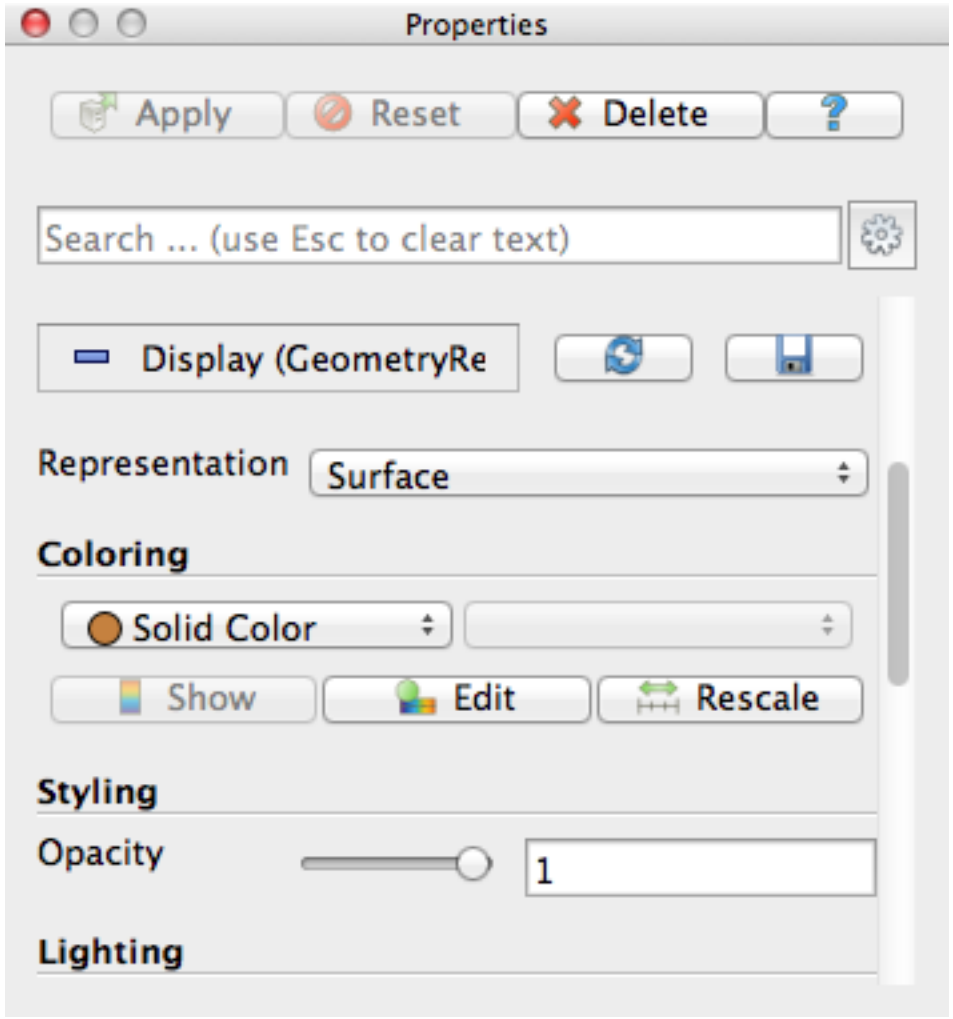
3. Increase the Resolution parameter.

4. Click the 

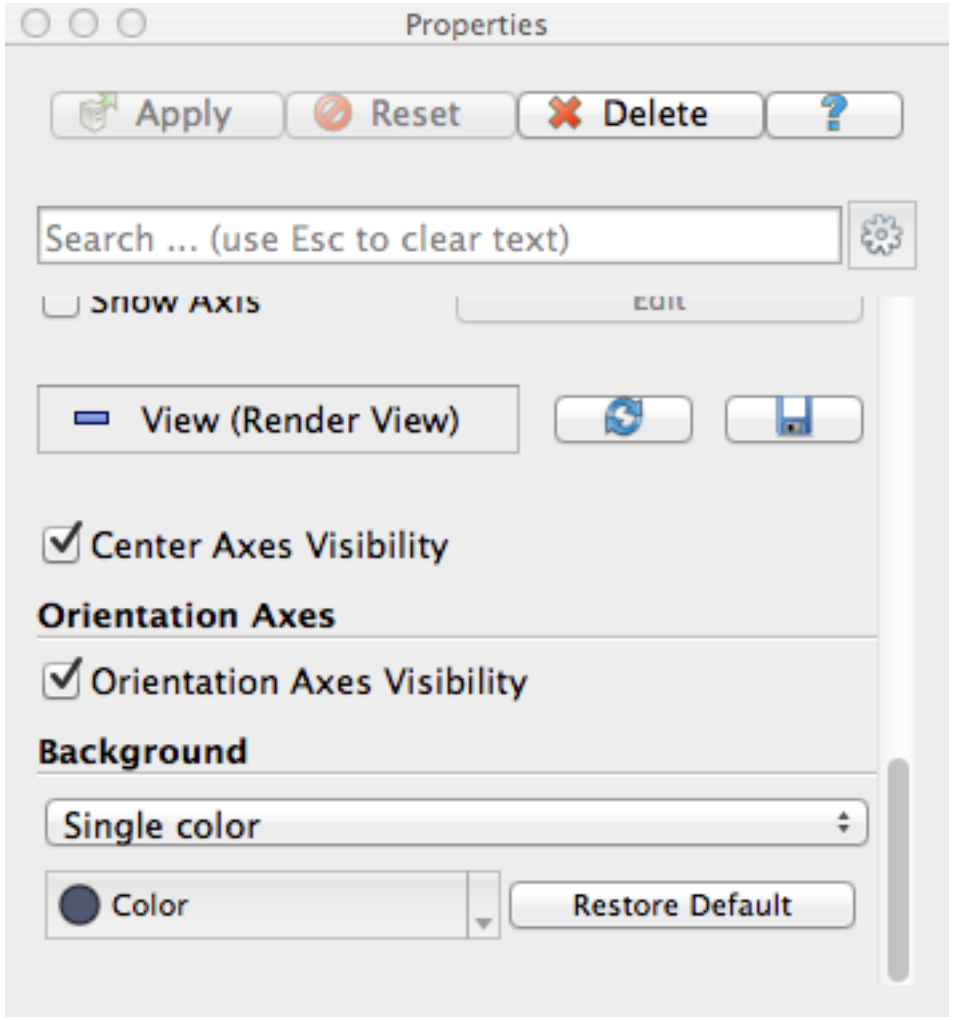
button again.

Pipeline Object Controls

Display Properties



Render View Options



Undo Redo

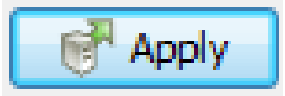
Undo

Redo

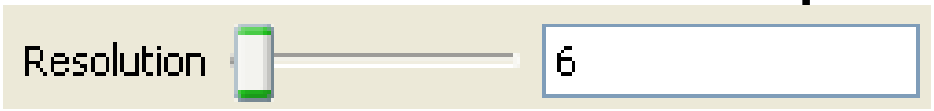
Camera Undo

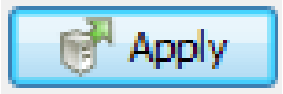
Camera Redo

Creating a Cylinder Source

1. Go to the Source menu and select Cylinder.
2. Click the Apply button to accept the default parameters. 

3. Increase the Resolution parameter.



4. Click the 

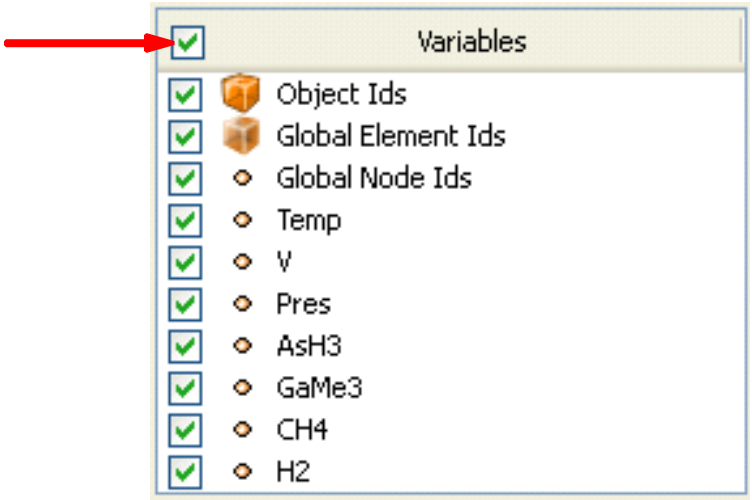
button again.
5. Delete the Cylinder. 

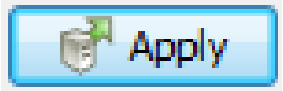
Supported Data Types

- ParaView Data (.pvd)
- VTK (.vtp, .vtu, .vti, .vts, .vtr)
- VTK Legacy (.vtk)
- VTK Multi Block (.vtm,.vtmb,.vtmg,.vthd,.vthb)
- Partitioned VTK (.pvtu, .pvti, .pvts, .pvtr)
- ADAPT (.nc, .cdf, .elev, .ncd)
- ANALYZE (.img, .hdr)
- ANSYS (.inp)
- AVS UCD (.inp)
- BOV (.bov)
- BYU (.g)
- CAM NetCDF (.nc, .ncdf)
- CCSM MTSD (.nc, .cdf, .elev, .ncd)
- CCSM STSD (.nc, .cdf, .elev, .ncd)
- CEAucd (.ucd, .inp)
- CMAT (.cmat)
- CML (.cml)
- CTRL (.ctrl)
- Chombo (.hdf5, .h5)
- Claw (.claw)
- Comma Separated Values (.csv)
- Cosmology Files (.cosmo, .gadget2)
- Curve2D (.curve, .ultra, .ult, .u)
- DDCMD (.ddcmd)
- Digital Elevation Map (.dem)
- Dyna3D(.dyn)
- EnSight (.case, .sos)
- Enzo boundary and hierarchy
- ExodusII (.g, .e, .exe, .ex2, .ex2v.., etc)
- ExtrudedVol (.exvol)
- FVCOM (MTMD, MTSD, Particle, STSD)
- Facet Polygonal Data
- Flash multiblock files
- Fluent Case Files (.cas)
- GGCM (.3df, .mer)
- GTC (.h5)
- GULP (.trg)
- Gadget (.gadget)
- Gaussian Cube File (.cube)
- JPEG Image (.jpg, .jpeg)
- LAMPPS Dump (.dump)
- LAMPPS Structure Files
- LODI (.nc, .cdf, .elev, .ncd)
- LODI Particle (.nc, .cdf, .elev, .ncd)
- LS-DYNA (.k, .lsdyna, .d3plot, d3plot)
- M3DCl (.h5)
- MFIX Unstructred Grid (.RES)
- MM5 (.mm5)
- MPAS NetCDF (.nc, .ncdf)
- Meta Image (.mhd, .mha)
- Miranda (.mir, .raw)
- Multilevel 3d Plasma (.m3d, .h5)
- NASTRAN (.nas, .f06)
- Nek5000 Files
- Nrrd Raw Image (.nrrd, .nhdr)
- OpenFOAM Files (.foam)
- PATRAN (.neu)
- PFLOTRAN (.h5)
- PLOT2D (.p2d)
- PLOT3D (.xyz, .q, .x, .vp3d)
- PLY Polygonal File Format
- PNG Image Files
- POP Ocean Files
- ParaDIS Files
- Phasta Files (.pht)
- Pixie Files (.h5)
- ProSTAR (.cel, .vrt)
- Protein Data Bank (.pdb, .ent, .pdb)
- Raw Image Files
- Raw NRRD image files (.nrrd)
- SAMRAI (.samrai)
- SAR (.SAR, .sar)
- SAS (.sasgeom, .sas, .sasdata)
- SESAME Tables
- SLAC netCDF mesh and mode data
- SLAC netCDF particle data
- Silo (.silo, .pdb)
- Spheral (.spheral, .sv)
- SpyPlot CTH
- SpyPlot (.case)
- SpyPlot History (.hscth)
- Stereo Lithography (.stl)
- TFT Files
- TIFF Image Files
- TSurf Files
- Tecplot ASCII (.tec, .tp)
- Tecplot Binary (.plt)
- Tetrad (.hdf5, .h5)
- UNIC (.h5)
- VASP CHGCA (.CHG)
- VASP OUT (.OUT)
- VASP POSTCAR (.POS)
- VPIC (.vpc)
- VRML (.wrl)
- Velodyne (.vld, .rst)
- VizSchema (.h5, .vsh5)
- Wavefront Polygonal Data (.obj)
- WindBlade (.wind)
- XDMF and hdf5 (.xmf, .xdmf)
- XMol Molecule

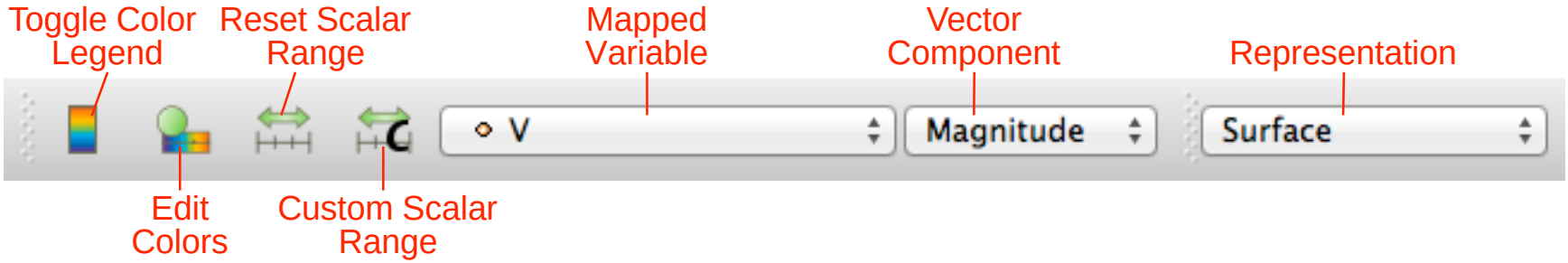
Load disk_out_ref.ex2

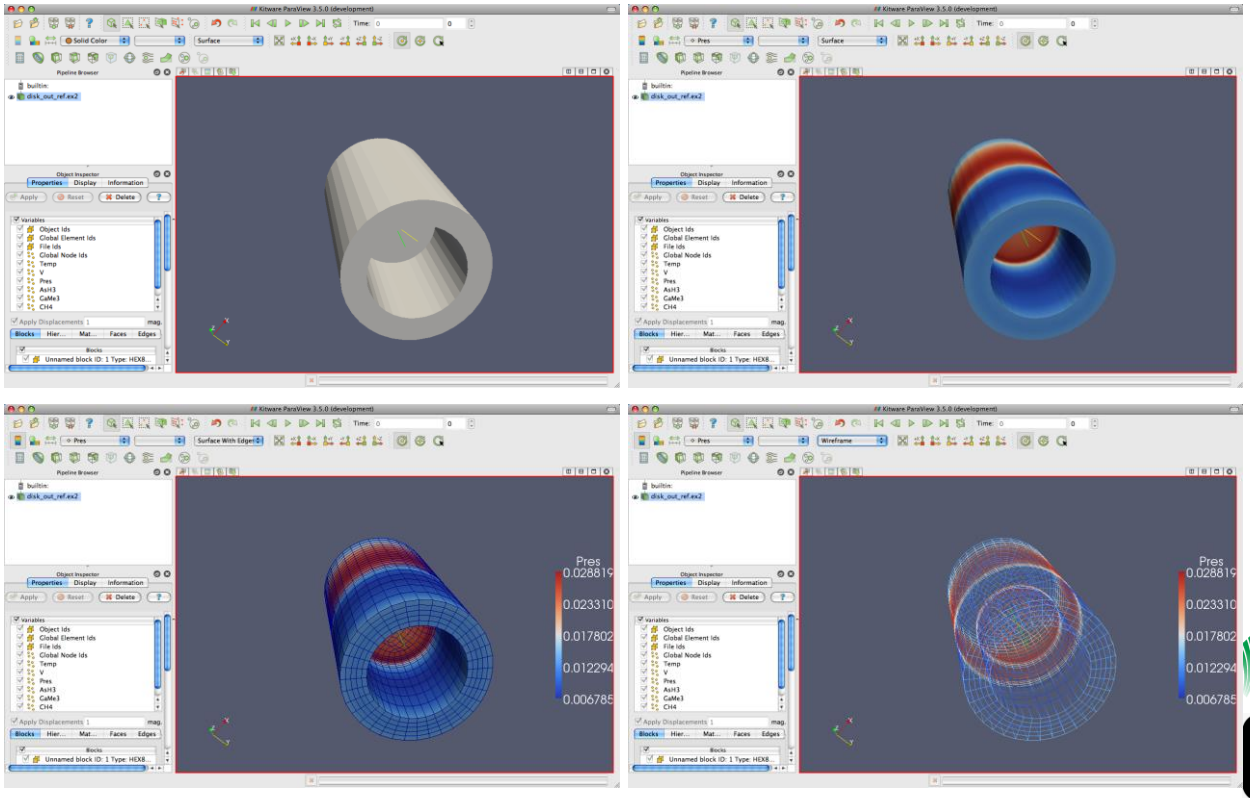
1. Open the file disk_out_ref.ex2.
2. Load all data variables.



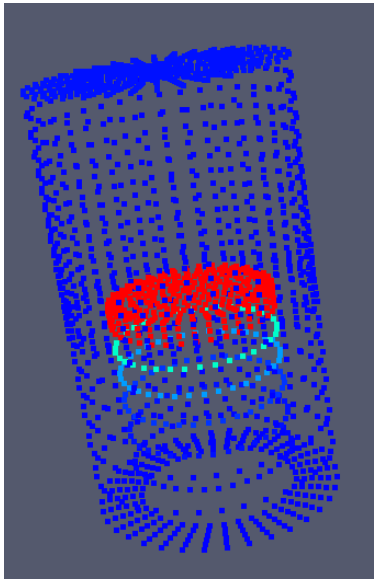
3. Click 

Data Representation

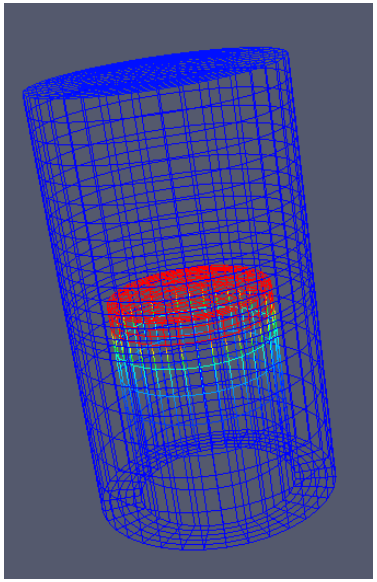




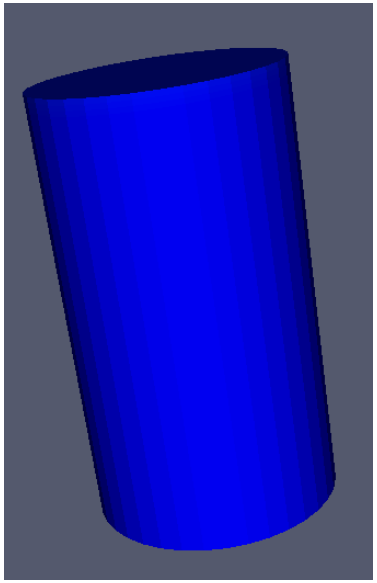
Geometry Representations



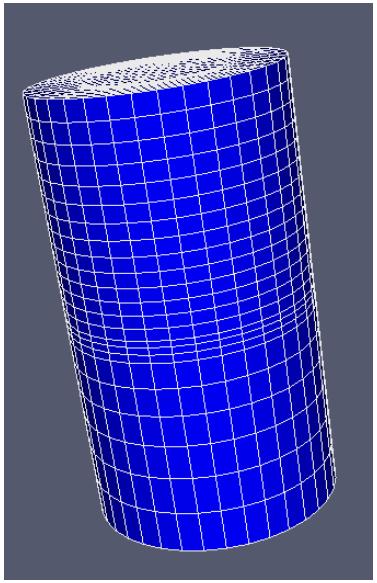
Points



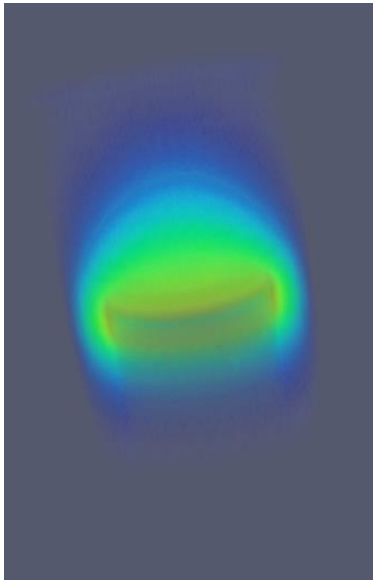
Wireframe



Surface



Surface
with Edges



Volume

Kitware

Sandia
National
Laboratories

Common Filters


Calculator


Contour


Clip


Slice


Threshold


Extract Subset


Glyph

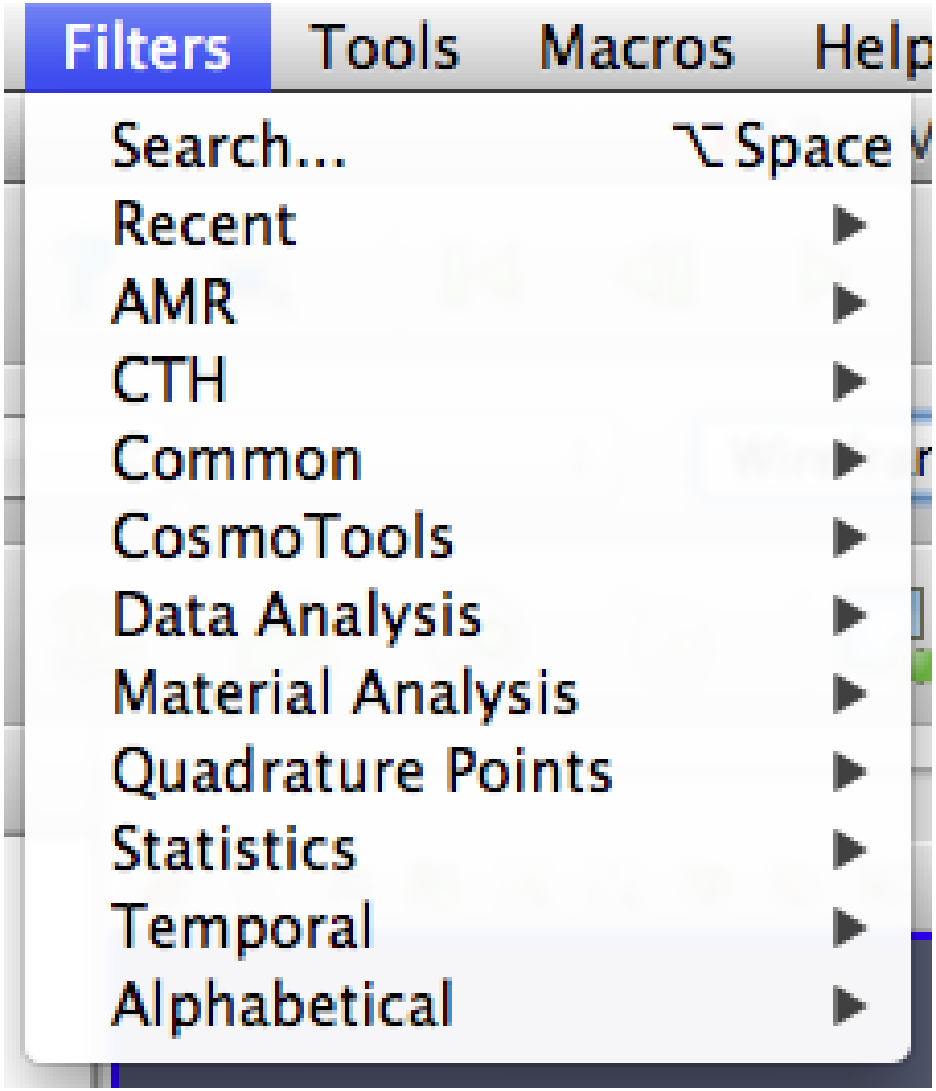

Stream Tracer


Warp (vector)

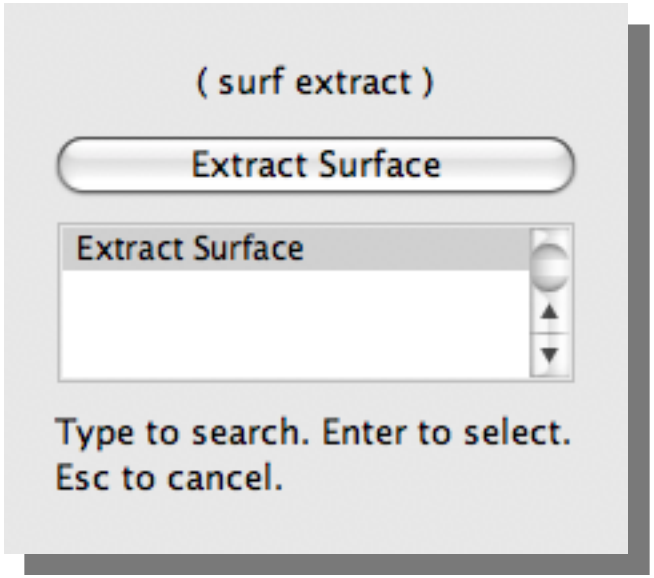

Group Datasets


Extract Level

Filters Menu



Quick Launch



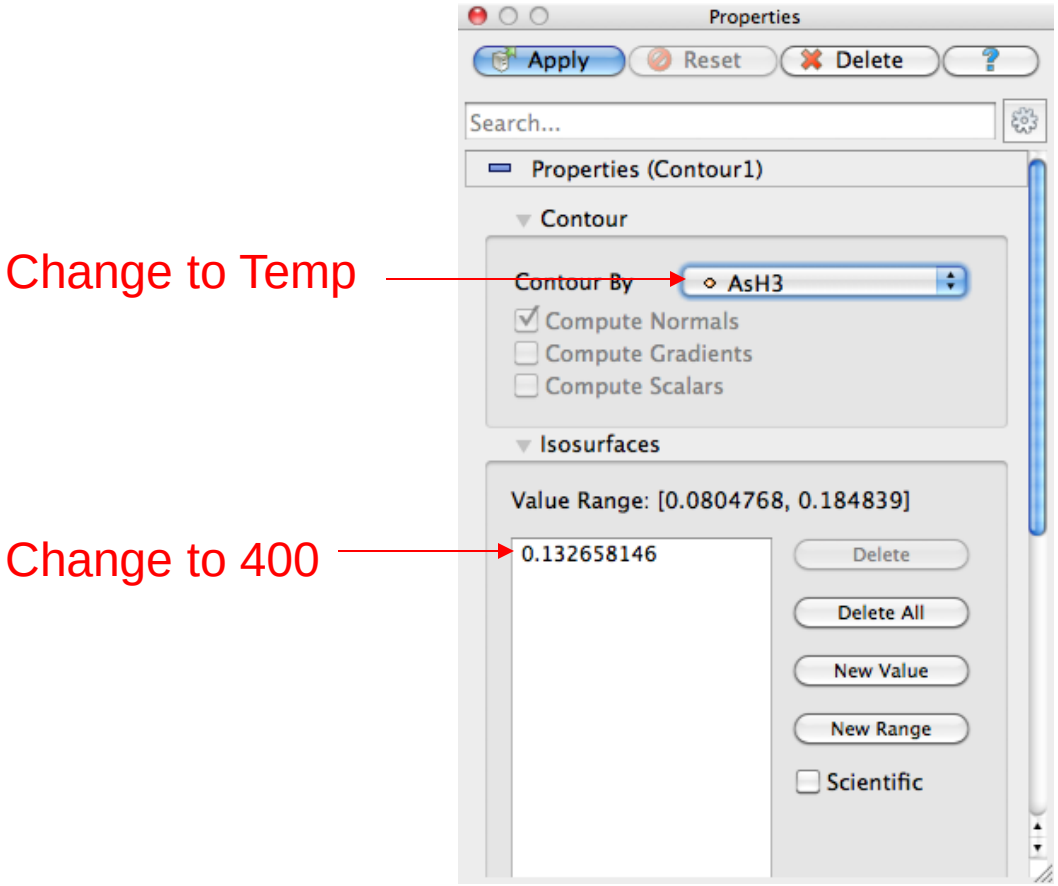
- Used for searching for filters by name
- Keyboard shortcut
  - Ctrl-space for Windows & Linux
  - Alt-space for Mac

Apply a Filter

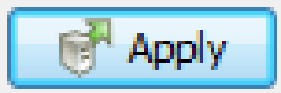
1. Make sure that disk_out_ref.ex2 is selected in the pipeline browser.
2. Select the contour filter. 

Apply a Filter

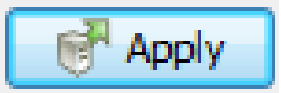
3. Change parameters to create an isosurface at Temp = 400K.



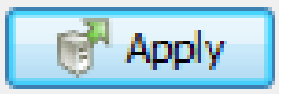
Apply a Filter

1. Make sure that disk_out_ref.ex2 is selected in the pipeline browser.
2. Select the contour filter. 
3. Change parameters to create an isosurface at Temp = 400K.
4. 

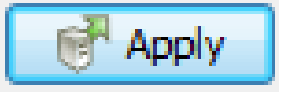
Create a Cutaway Surface

1. Select disk_out_ref.ex2 in the pipeline browser.
2. From the quick launch, select Extract Surface.
3. 

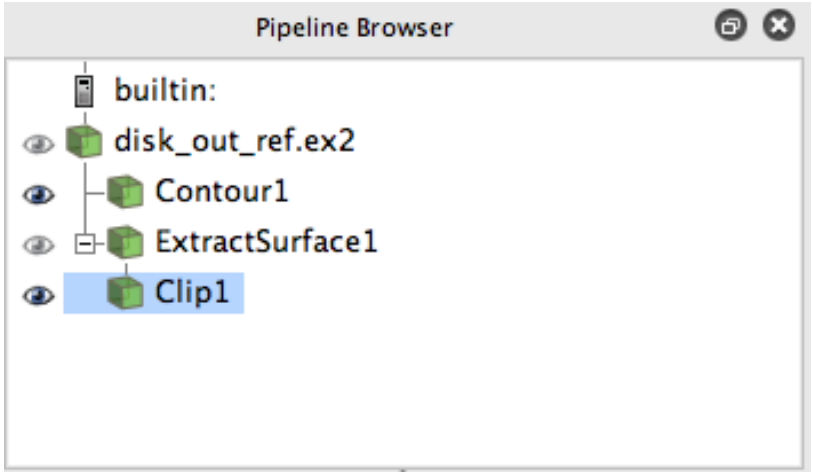
Create a Cutaway Surface

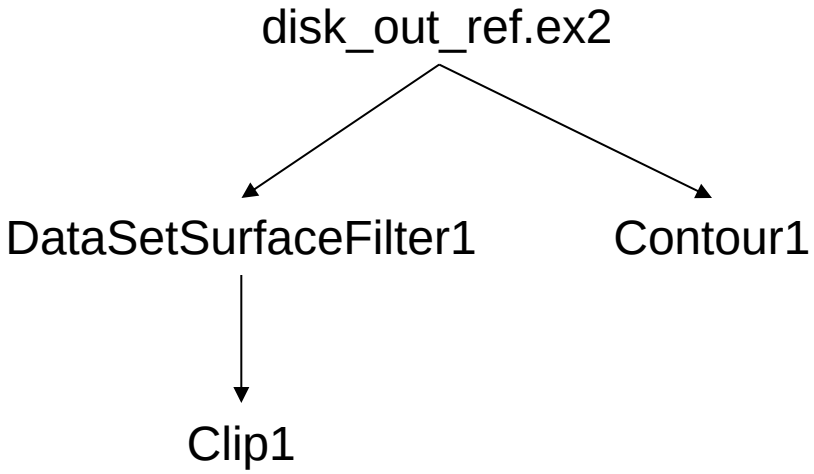
1. Select disk_out_ref.ex2 in the pipeline browser.
2. From the quick launch, select Extract Surface.
3. 

4. Create a clip filter. 
5. Uncheck Show Plane. 

6. 

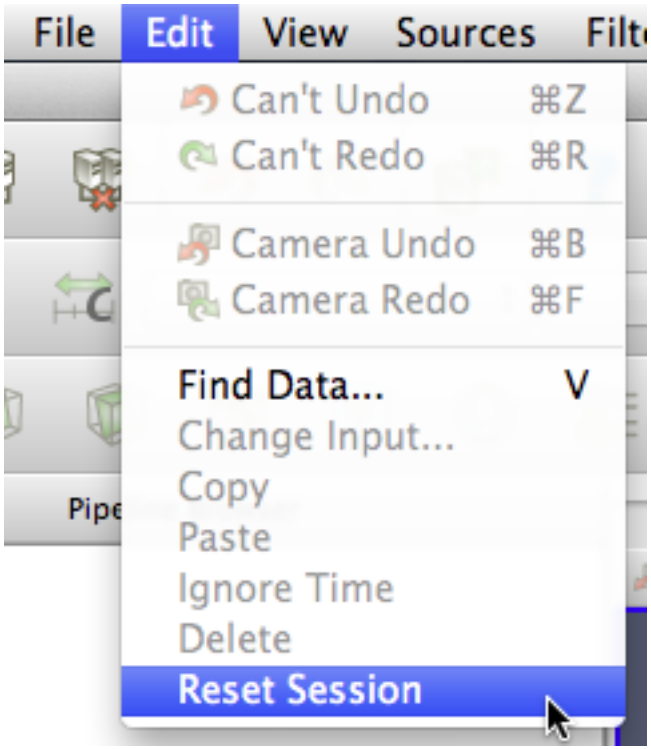
Pipeline Browser Structure



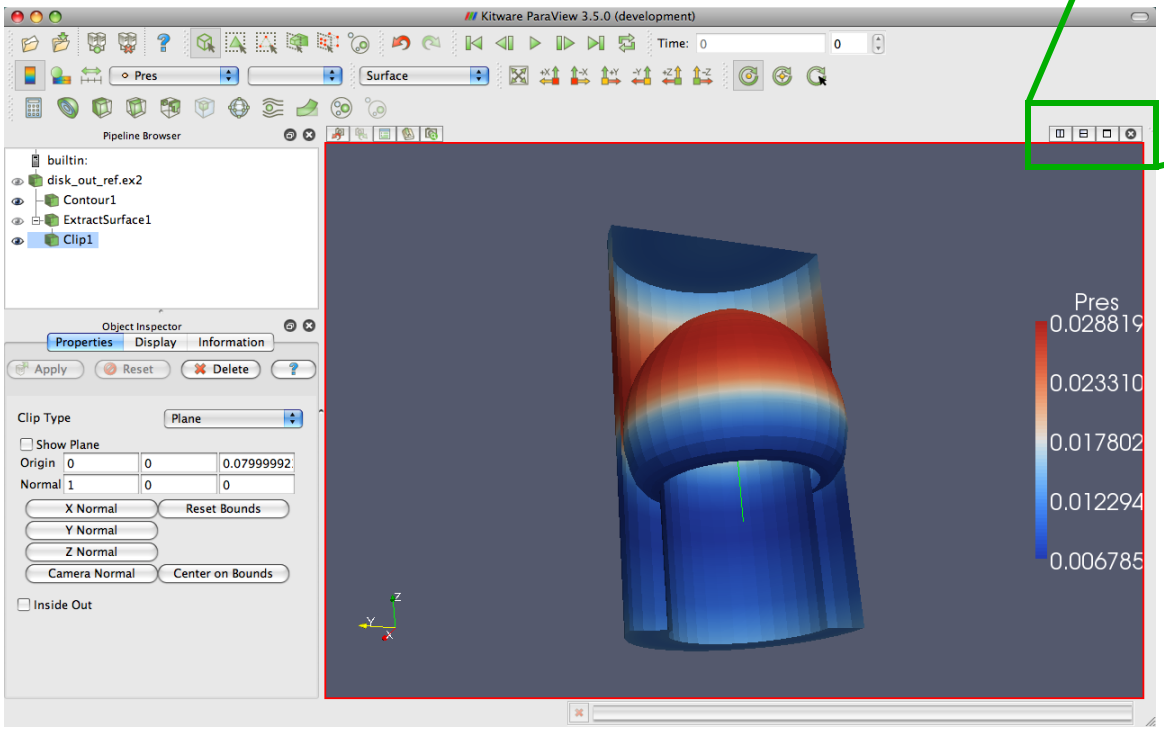


Reset ParaView

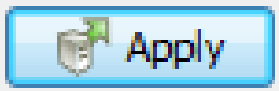
Edit → Reset Session



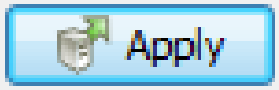
Multiview


Kitware ParaView 3.5.0 (development)
Time:
Pres
Surface
Pipeline Browser
builtin:
disk_out_ref.ex2
Contour1
ExtractSurface1
Clip1
Object Inspector
Properties
Display
Information
Apply
Reset
Delete
Clip Type
Plane
Show Plane
Origin
Normal
X Normal
Y Normal
Z Normal
Reset Bounds
Camera Normal
Center on Bounds
Inside Out
Pres
0.028819
0.023310
0.017802
0.012294
0.006785

Multiview

1. Open disk_out_ref.ex2. Load all variables. 

2. Add Clip filter. 
3. Uncheck Show Plane. 

4. 

5. Color surface by Pres.

Multiview

6. Split the view horizontally. 
7. Make Clip1 visible. 
8. Color surface by Temp.

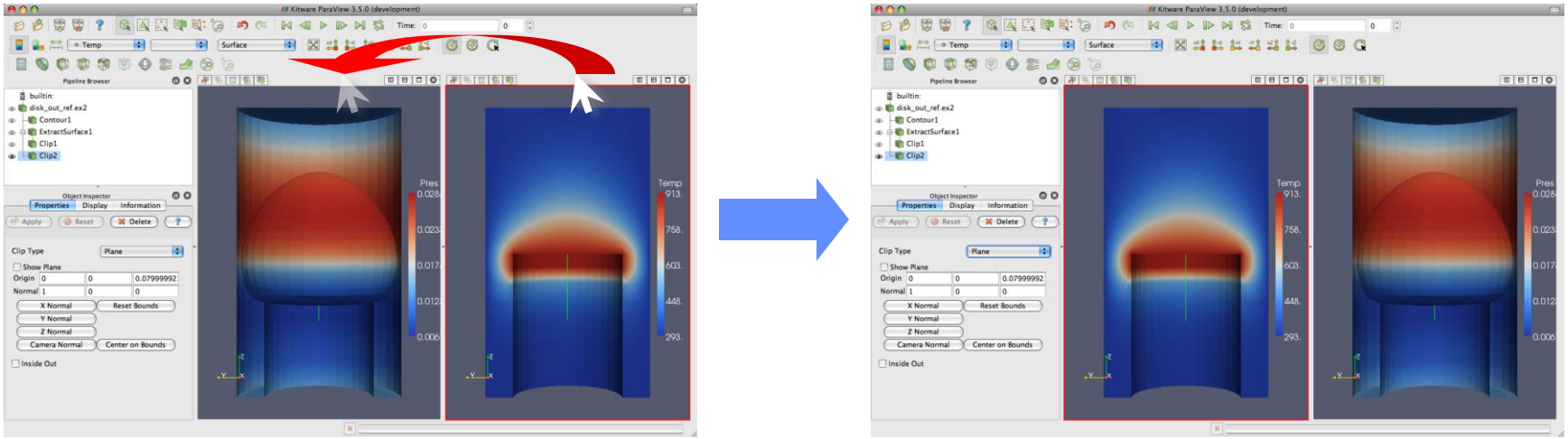
Multiview

6. Split the view horizontally. 
7. Make Clip1 visible. 
8. Color surface by Temp.
9. Right-click view, Link Camera...
10. Click other view.

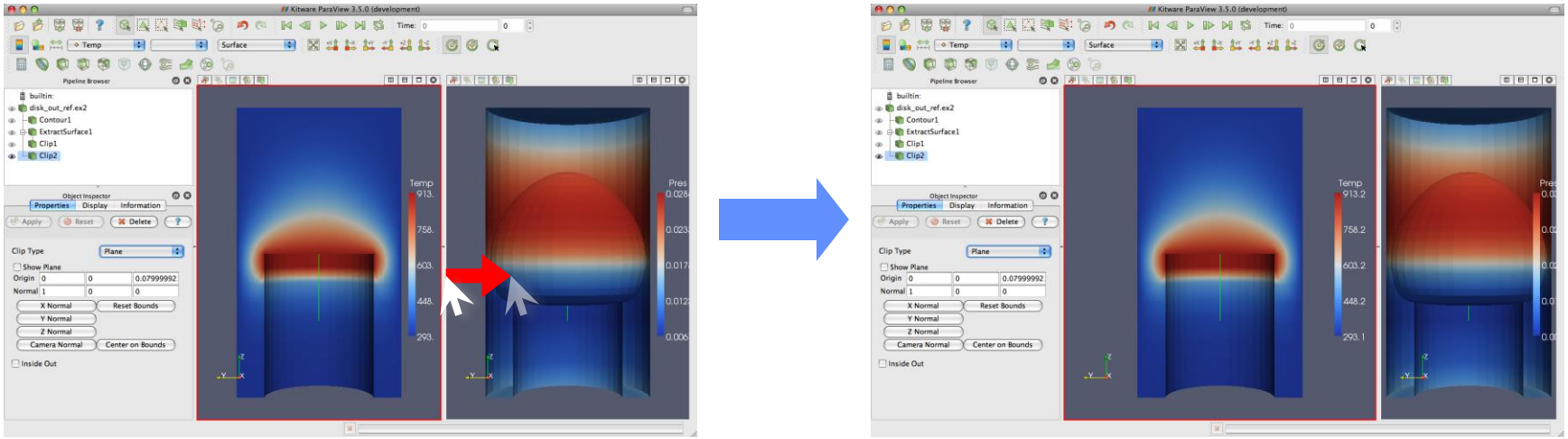
Multiview

6. Split the view horizontally.
7. Make Clip1 visible.
8. Color surface by Temp.
9. Right-click view, Link Camera...
10. Click other view.
11. Click 

Modifying Views

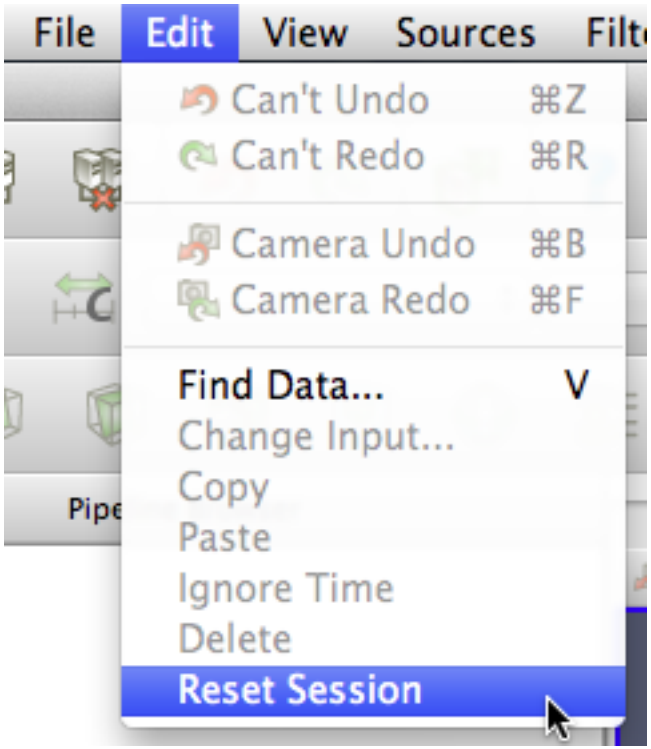


Modifying Views

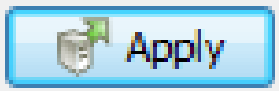


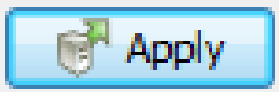
Reset ParaView

Edit → Reset Session

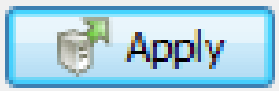


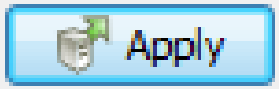
Streamlines

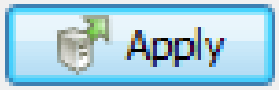
1. Open disk_out_ref.ex2. Load all variables. 

2. Add Stream Tracer. 
3. 

Streamlines

1. Open disk_out_ref.ex2. Load all variables. 

2. Add Stream Tracer. 
3. 

4. From the quick launch, select Tube
5. 

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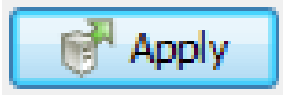
Getting Fancy

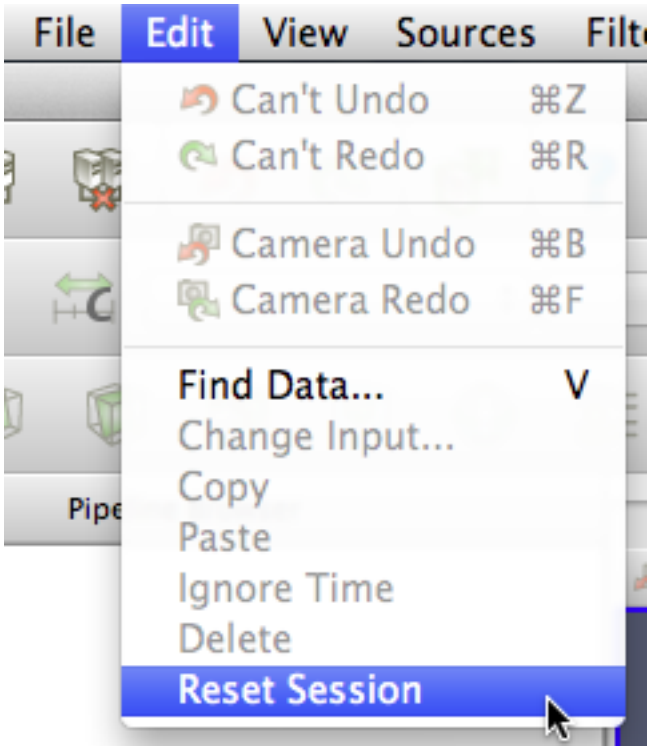
6. Select StreamTracer1.
7. Add Glyph filter. 
8. Change Vectors to V.
9. Change Glyph Type to Cone.
10. 

Getting Answers

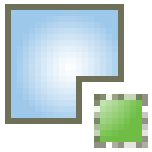
- Where is the air moving the fastest? Near the disk or away from it? At the center of the disk or near its edges?
- Which way is the plate spinning?
- At the surface of the disk, is air moving toward the center or away from it?

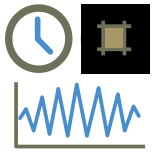
Reset ParaView

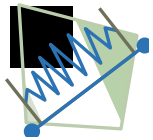
Edit → Reset Session



Common Data Analysis Filters


Extract Selection

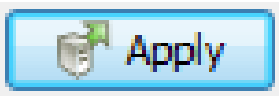

Plot Global Variables Over Time


Plot Over Line

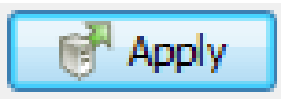

Plot Selection Over Time

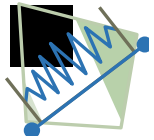

Probe Location

Plotting

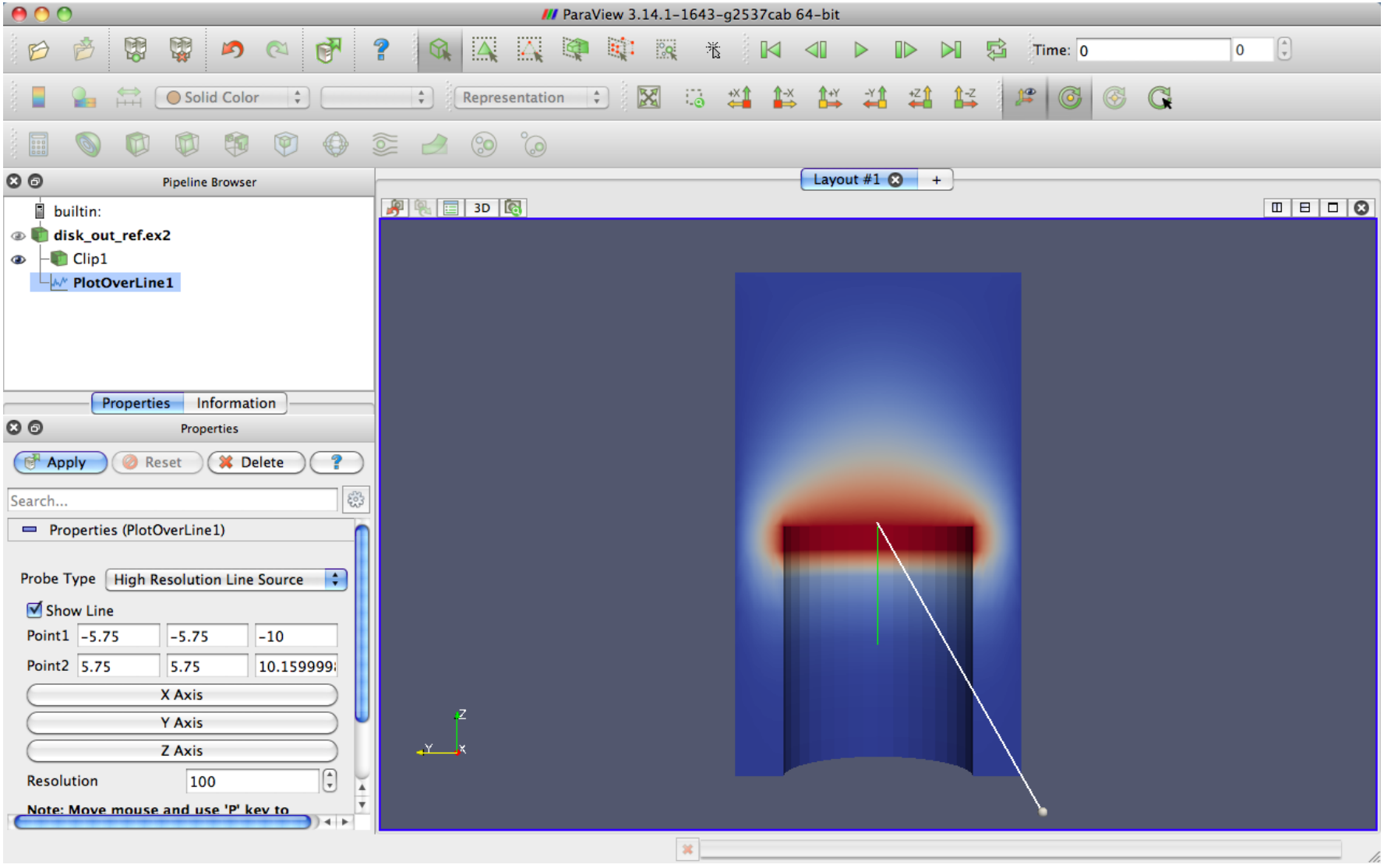
1. Open disk_out_ref.ex2. Load all variables. 

2. Clip,  uncheck, 

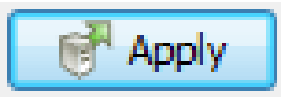
, 

3. Select disk_out_ref.ex2.
4. Add Plot Over Line filter. 

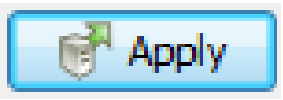
3D Widgets

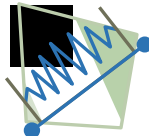
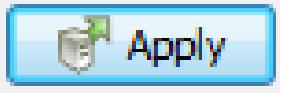

ParaView 3.14.1-1643-g2537cab 64-bit
Time: 0
0
Solid Color
Representation
Pipeline Browser
builtin:
disk_out_ref.ex2
Clip1
PlotOverLine1
Properties
Information
Properties
Apply
Reset
Delete
Search...
Properties (PlotOverLine1)
Probe Type
High Resolution Line Source
Show Line
Point1
-5.75
-5.75
-10
Point2
5.75
5.75
10.159999
X Axis
Y Axis
Z Axis
Resolution
100
Note: Move mouse and use 'P' key to
Layout #1
3D

Plotting

1. Open disk_out_ref.ex2. Load all variables. 

2. Clip,  uncheck, 

, 

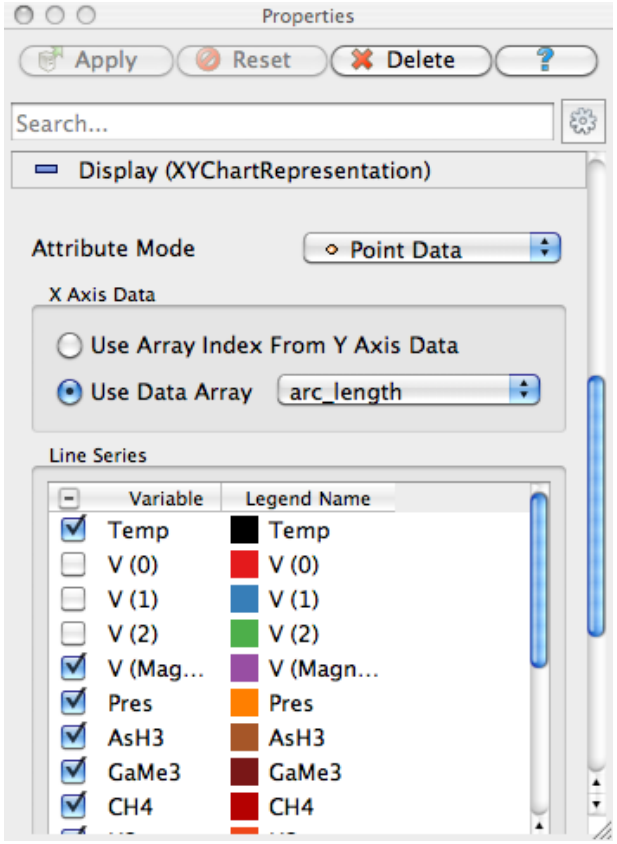
3. Select disk_out_ref.ex2.
4. Add Plot Over Line filter. 
5. Once line is satisfactorily located, 

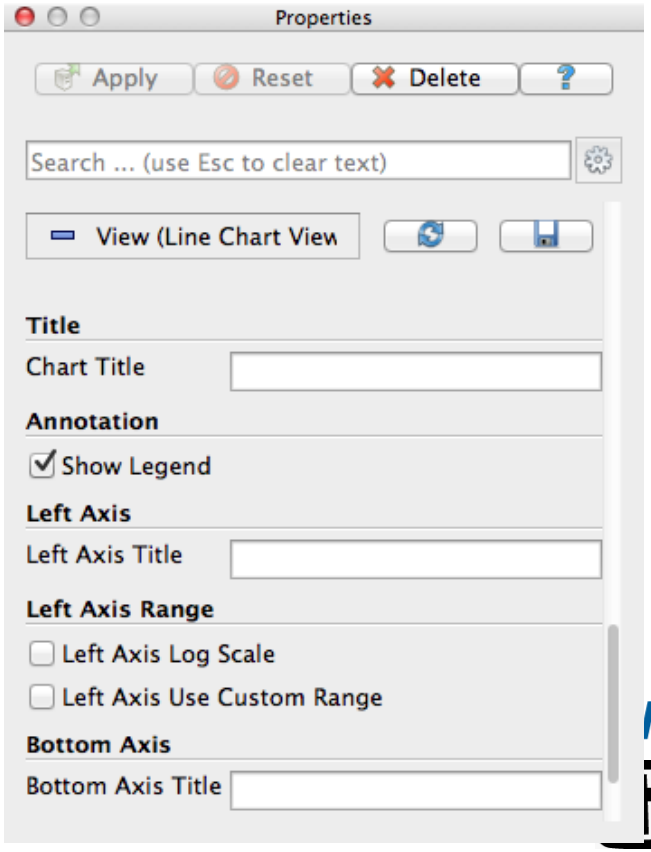
Interacting with Plots

- Left, middle, right buttons to pan, zoom.
- Mouse wheel to zoom.
- Reset view to plot ranges. 

Plots are Views

- Move them like Views.
- Save screenshots.





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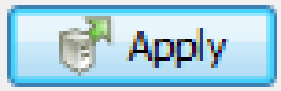
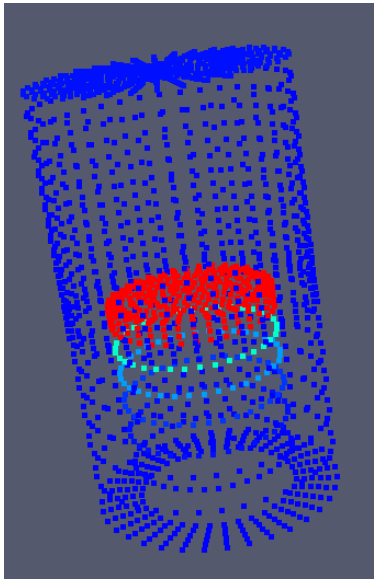
Adjusting Plots

1. In Display section of properties panel, turn off all variables except Temp and Pres.
2. Select Pres in the Display options.
3. Verify the relationship between temperature and pressure.

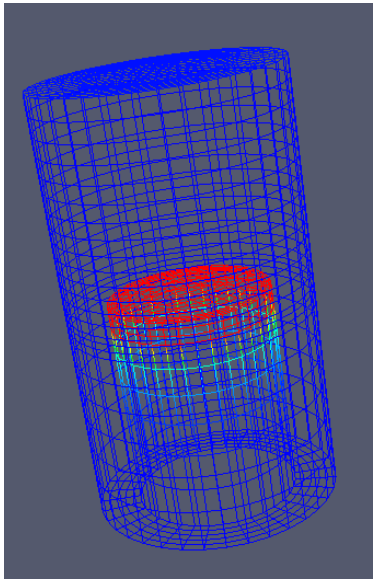
Histogram / Bar Chart

1. Select disk_out_ref.ex2.
2. Filters → Data Analysis → Histogram 
3. Change Input Array to Temp.
4. 

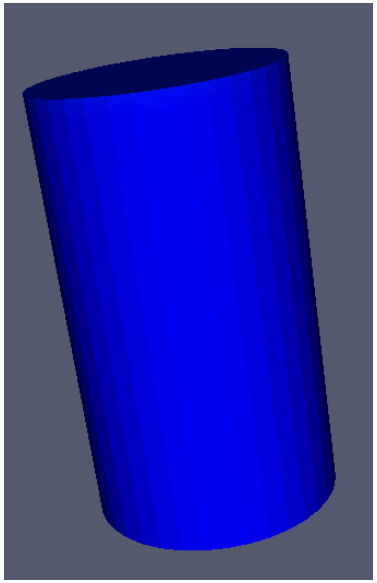
Geometry Representations



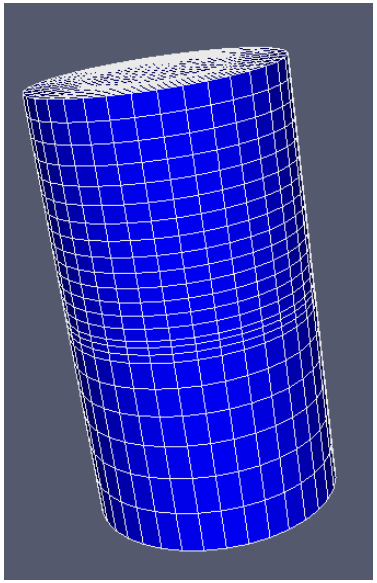
Points



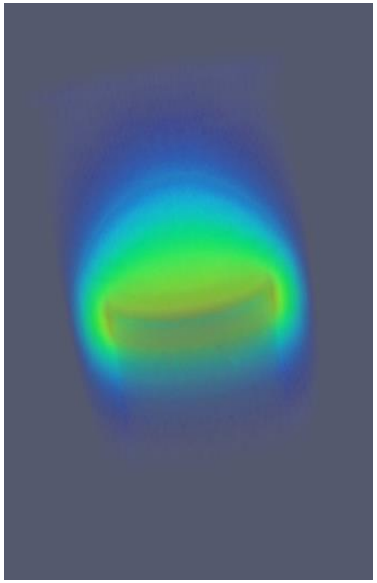
Wireframe



Surface



Surface
with Edges



Volume

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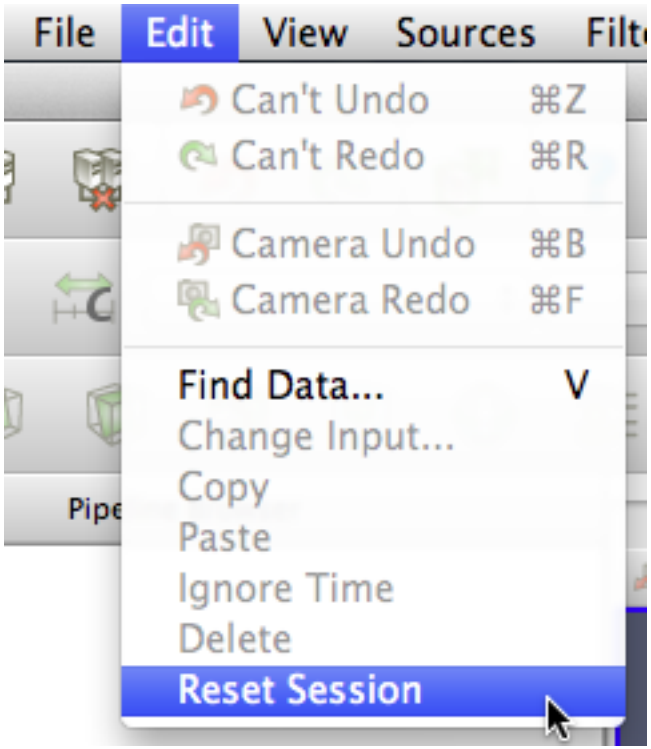
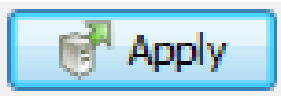
Reset ParaView

Edit → Reset Session



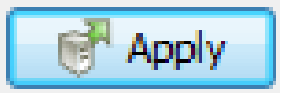
Volume Rendering + Surface Geometry

1. Open disk_out_ref.ex2. Load all variables. 

2. Change variable viewed to Temp.
3. Change representation to Volume.

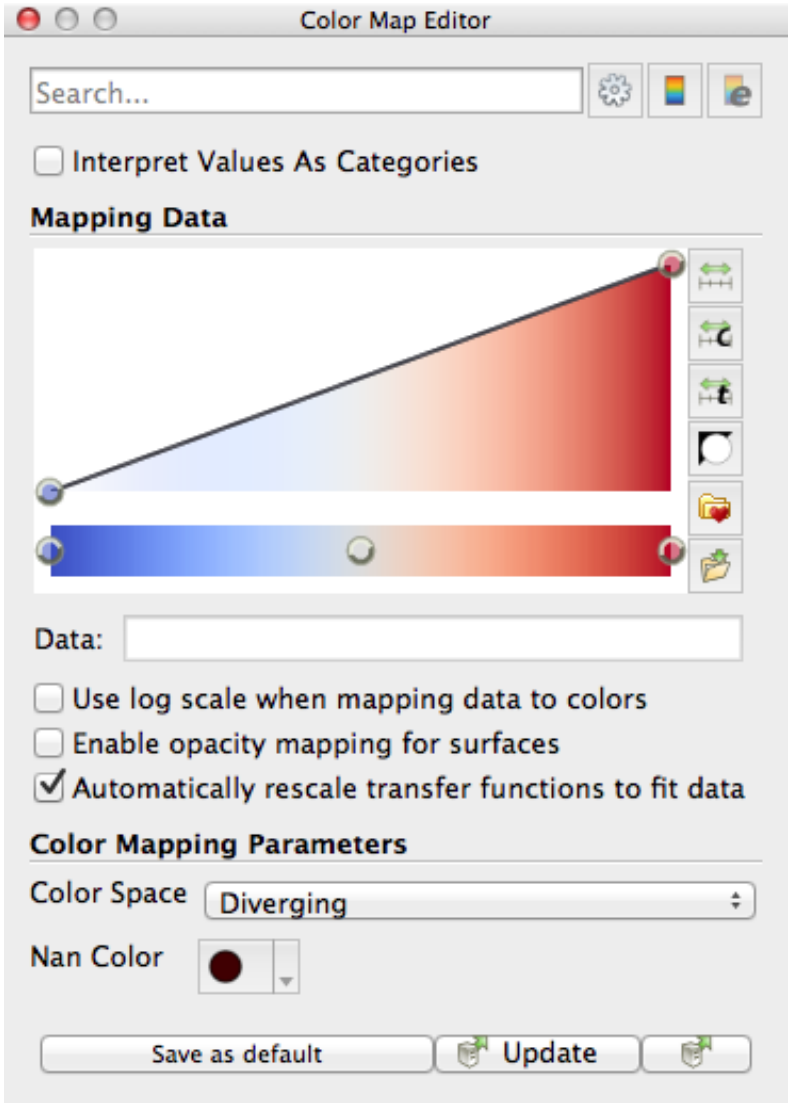
Volume Rendering + Surface Geometry

1. Open disk_out_ref.ex2. Load all variables. 

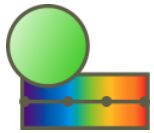
2. Change variable viewed to Temp.
3. Change representation to Volume.
4. Add Stream Tracer.  

5. Optional: Add Tubes and Glyphs.

Transfer Function Editor



Modify Transfer Function

1. Select disk_out_ref.ex2.
2. Click Edit Color Map  .
3. Click Choose preset  .
4. Select Black-Body Radiation. Close.
5. Try adding and changing control points.

Volume Rendering (data\headsq.vti)