

EagleClaw - An Easy Access Graphical Laboratory for Exploring Conservation Laws

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Outline

- 1 Introduction
- 2 Technologies
- 3 Future Work
- 4 Demo

Easy Access Graphical Laboratory for Exploring Conservation Laws.

Web-page interface to Clawpack (Conservation Laws Package).

Goals:

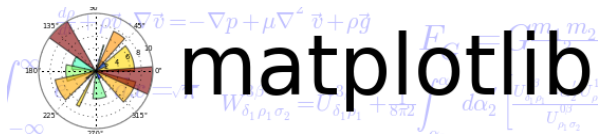
- **Web portal:** Clawpack can be used remotely on selected examples without downloading or installing.
Useful for:
 - Trying it out before installing.
 - Students learning about hyperbolic problems who aren't interested in the numerical methods or dealing with Fortran code.
- Alternative interface to Clawpack for use on local machine by those who have downloaded Clawpack.
 - Should be easy to modify html pages and cgi scripts to adapt to the user's own problem.
- Interface to documentation and html versions of source code.
- New approach to **literate programming**.

- Python - Provides the “glue” for all the technologies
- matplotlib - Plotting routines
- jsMath and mathcode2html - Provides human readable mathematics and code viewing
- Apache - Web server
- Clawpack - Computing engine



Python provides the “glue” for all the services used

- Parse forms from the web server
- Runs a standalone cgi server as opposed to using Apache
- Generate plots through Matplotlib
- Basis of a more general toolset



- Python based 2D plotting library
- Uses a variety of backends for graphics and output
- Closely mimics Matlab syntax
- <http://matplotlib.sourceforge.net/>

- jsMath
 - Collection of java scripts that automate insertion of \LaTeX
 - Uses native fonts
 - Quickly loads pages
 - Scales with the size of the fonts
 - Insert equations directly into html code
 - <http://www.math.union.edu/~dpvc/jsmath/>
- mathcode2html
 - Python script that converts code into html with \LaTeX capability
 - Also can process simple wiki commands
 - Uses jsMath for the \LaTeX portions
 - <http://www.amath.washington.edu/~rjl/mathcode2html/>



- Standard web server technology
- Can easily be setup to run complex content
- Security is an issue to be aware of when creating cgi content

- Used to numerically solve hyperbolic partial differential equations using a wave propagation approach
- Primarily written in Fortran 77, efforts under way to move parts to Fortran 95/2003
- Clawpack 5.0 will include Eagleclaw and other additions
- A python based version of Clawpack is currently under development (Pyclaw)
- For details see <http://www.clawpack.org/>

Future Improvements

- Unify all the examples into one cgi script
- Use SCons for compilation if needed
- Use Pyclaw for the backend (instead of compiled binaries)
- Create a user interface for creating examples
- Allow greater flexibility in comparison and saving settings
- Incorporate Visit visualization, will include 3D interactive graphics
<https://wci.llnl.gov/codes/visit/>

- Eagleclaw
- mathcode2html