EagleClaw - An Easy Access Graphical Laboratory for Exploring Conservation Laws

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The University of Washington Signature consists of two components: the symbol and the logotype. The symbol and logotype are a single unit created by an established relationship. This relationship remains consistent throughout all applications. The Signature represents the entire University, and can also be used to imply the Seattle Campus alone.

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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.**
Technologies

- 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
Matplotlib

- Python based 2D plotting library
- Uses a variety of backends for graphics and output
- Closely mimics Matlab syntax
- http://matplotlib.sourceforge.net/
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### 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/](http://www.math.union.edu/~dpvc/jsmath/)

### matchcode2html
- Python script that converts code into html with \LaTeX capability
- Also can process simple wiki commands
- Uses jsMath for the \LaTeX portions
Apache Web Server

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

- 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/
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- Eagleclaw
- mathcode2html