

HiPAS GridLAB-D

Task 3 - Source Code Presentations

Topics covered

Multi-threading Iterators

Job control

Multi-threading Solvers

Stochastic Properties

Fast Data Access

Fast Powerflow Solvers

Online Documentation

General considerations

Upgrades to GridLAB-D core

- C/C++ code
 - Multi-threading
 - Stochastic variables
- Python module
 - Fast data access
 - Fast powerflow solver

Upgrades to external resources

- New subcommands
 - Job Control
- New online resources
 - Online documentation

Multi-threading

Multi-Threading Iterators (MTI)

- Convert code from C to C++
- Upgrade core entity/property loops
 - Schedules
 - Transforms
 - Loadshapes
 - Enduses
 - Randomvar
- Upgrade MTI module event loops
 - Init
 - Precommit
 - Sync
 - Commit
 - Term

Stochastic Variables

Correlated random variables

- Source random variable
- Correlation scale
- Correlation bias

Allow cascade of correlated variables

Avoids cholesky covariance decomposition

Properties of randomvar

- `type:<distribution>(<parameters>)`
- `min/max:<bound>`
- `refresh:<rate>`
- `state:<seed>`
- `correlation:<obj.prop>*<scale>+<bias>`
- `integrate`

Fast Data Access

Embedded python module

- "module <python> { <globals> ... }"

Data accessors

- get(<category>)
- get_global(<name>)
- get_value(<object>, <name>)
- get_class(<name>)
- get_object(<object>)
- get_transform(<name>)
- get_property(<object>, <name>)
- set_global(<name>, <value>)
- set_value(<object>, <name>, <value>)

Other utility methods:

- title, version, copyright, credits, license
- output, debug, warning, error
- reset, command
- start, wait, cancel, pause, pauseat, resume
- module, add, load, save
- convert_unit, pstatus, add_callback

Fast Powerflow Solvers

Machine learning enhanced solver (solver_py)

- Hooked into NR solver

solver_python_solve()

- Calls ML solver before NR
- Suppresses NR solver on success

solver_python_learn()

- Called after NR
- Updates ML solver if NR succeeds

NR bus/branch data

- Copied to/from python memory
- Operations differ for solve/learn
- Solves include learned NR results

Topology change detection

- Topology hashes
- Include real value change sensitivity

Job Control

Job subcommand dispatches multiple runs

- CSV file guides runs
- Include global values/parameters
- Configuration (GLM globals, clock, etc.)
- Modify file (object property modifications)
- Work directory
- Thread count limit

Example job CSV:

1	TEST1	TEST2	TEST3	TEST4
2	0	A	B	C
3	1	D	E	F
4	2	G	H	I
5	3	J	K	L
6	4	A	B	C
7	5	D	E	F

Online Documentation

SLAC GISM0 Docs Browser

- Deployed at docs.gridlabd.us
- Support markdown format

Features

- Project/branch selections
- Button bar
- Mathjax
- Images and videos

The screenshot displays the 'Docs-Browser' interface for 'SLAC GISM0'. The browser is running on 'docs.gridlabd.us'. The interface includes a top navigation bar with logos for the U.S. Department of Energy, SLAC National Accelerator Laboratory, and GISM0. Below this, there are input fields for 'Host' (github.com), 'User/Org' (slacgismo), 'Project' (gridlabd), and 'Branch' (master). A 'Table of Contents' is visible on the left, listing various sections like Cloud, Command, Converters, Developer, GLM, Global, Install, Module, Server, Subcommand, Tips and tricks, Tutorials, and more. The main content area shows the 'HIPAS GridLAB-D 4.2 User Documentation' page. This page features a large blue banner with the text 'FUNDING PROVIDED BY THE CALIFORNIA ENERGY COMMISSION' and the California Energy Commission logo. Below the banner, there is a paragraph of text stating that the documentation is for HIPAS GridLAB-D, developed by Stanford University at SLAC National Accelerator Laboratory under funding from the California Energy Commission. It also mentions that the current research version of GridLAB-D is available from ShoutWiki. At the bottom, there is a 'Cookie Policy' section and a 'Cookie Control' bar.