



OpenSEES Workshop Sept 2 and 3, 2010

9:45-11:00 Cloud Computing, NEEShub & OpenSees

11:00-12:00 NEEShub Hands-On

Gregory P. Rodgers Ph.D.
NEESComm IT



9:45-11:00 Cloud Computing, NEEShub & OpenSees

Agenda:

- Introduction to HUB technology
 - More than a new website
- NEEShub: the New nees.org
 - 1. Website
 - 2. Resources
 - 3. Tools and Tool-Data Management
 - webdav
 - rappture
 - Synchronees
 - 4. NEES Project Warehouse
- Opensees in nees.org
 - opensees2
 - openseeslab
 - openseesbuild
- Future
 - Batch Strawman for OpenSees
 - Integration with plotting tools

Introduction to HUBzero

- HUBzero™ is a platform used to create dynamic web sites for scientific research and educational activities. With HUBzero, you can easily publish your research software and related educational materials on the web.
- Powerful middleware serves up interactive simulation and modeling tools via your web browser. These tools connect you with rendering farms and powerful Grid computing resources.
- Proven with the nanoHUB. nanoHUB supports over 100,000 worldwide users, hundreds of nanotechnology tools, and constant worldwide collaboration. Also supported by NSF. Many smaller hubs also exist.
- NEEScomm IT has adopted HUBzero technology to transition nees.org to NEEShub. The URL is the same, the infrastructure is completely updated.

NEEShub: The new nees.org

	NEES Communications & Support	NEES Engineering, Research, & Development
Dynamic / Transient	1. Joomla Website	3. HUB tools with personal and group data
Static / Permanent	2. HUB Resources	4. NEES Project Warehouse

Main Menu Organization

- Tools & Resources – User and NEES contributed content (e.g. videos, publications, simulation tools)
- Education & Training – NEES Academy
- Project Warehouse - Perpetual database of research projects
- Sites- NEES Sites and related information
- Collaborate – User oriented collaboration options
- Explore – Information managed by NEESComm

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1. The nees.org website

- **NEES Communication Portal**
 - Activities
 - Calendar
 - News and Reports
 - Videos
 - nees.org general content Contact: Allegra East
- **NEES Education Outreach and Training**
 - Education organized for Teachers, Students, Professionals, and the Public
 - Initial Source of many HUB Resources
 - Contact: Sean Brophy



2. Resources

- **Resource Types**
 - Documents Library
 - Learning Objects
 - Series
 - Citations
 - Tools
- **Organization by Resource Types and tags.**
 - Parent tags coming soon.
- **Searchable**
- **Each resource has a permanent URL.**
- **Anyone can contribute but publication is monitored.**



3. NEES Tools and Workspace Data Management

- HUB tools run in a virtual machine with access to a persistent file system. No installation required.
- Anyone can contribute a tool.
- Organization of NEES tools is a work-in-progress.
 - Hundreds of Tools in NanoHub
 - Tags defined by tool owner help to organize tools
- One very important tool: Workspace
 - A Linux desktop with access to personal HOME and shared group data.
 - This is where tool developers build and test tools .
- Please consider contributing tool with graphical interface to your Opensees simulation model.
 - TCL extension available to OpenSees TCL for building GUI. This is called Rappture.
- Two types of data
 - HOME directory, Quota is 1GB but extendable with a ticket
 - Group space



4. NEES Project Warehouse

- Perpetual Database for NEES Research Projects
 - Required for NEES funded projects
 - Migrated from old NEES Central
 - A combination of Oracle database and filesystem
 - Access managed by PIs who create projects.
- Three access methods to Warehouse
 - Nees.org project warehouse <http://nees.org/warehouse>
 - PEN , a Java tool for moving data in and out of the warehouse from HUB or local workstation.
 - Web services (API).
- New for NEEShub.
 - HUB Tools have read-access to data stored in Warehouse file system.
/nees/home/<PROJECT NAME>.groups/
 - Read-only ftp server authenticated with your nees.org userid and password
ftp neesws.neeshub.org

NEEShub
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OpenSees

Project Warehouse

P1 Project Files
P2 Project Files
P_N Project Files

Oracle

NEEShub Project Warehouse Tool

Remote Workstation

NEEShub VM PEN
NEEShub VM PEN
PEN

Bulk Data Collection with PEN
From one or more sources (PENs)

Tools operate on data in a PEN or generate data to a PEN

NEES-2010-682
(c:/data/myproj)
analysis
documentation
metadata
experiments
public
referencefile.dat
download_this.d
modified_this.dat
local_only_file.dat
log_file1.dat
logfile2.dat
file_not_local.dat

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NEEShub
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OpenSees

OpenSees in nees.org

- The OpenSees binary was built for Debian Linux
 - Not directly executable (except through workspace.
 - User interface tools use this binary to run OpenSees
- A Rapture-based *developer* interface was created to manage a set of simulation models stored in a user's home directory. (Called opensees2)
 - <http://nees.org/resources/opensees2>.
 - One model per directory in \$HOME/opensees2/<name>/<name>.tcl
 - 5 examples copied to \$HOME/opensees2 that show GUI and non-GUI models
- Frank built a more elaborate GUI framework for specific models. No need to understand TCL to operate. (Called OpenSees Lab)
 - <http://nees.org/resources/openseeslab>
- We expect TCL model developers to contribute reusable models with GUIs as new HUB tools for easier execution by users who are not TCL developers.
 - <http://nees.org/resources/???>

Or Frank could include GUIs and models in OpenSees Lab.

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Batch Strawman for OpenSees in NEEShub.

- Three Options
 - Default : Run OpenSees in the HUB interactively
 - Medium: Submit 4-processor job to Purdue Condor pool.
 - Large: Submit 16-processor job to Terragrid
- Medium and Large options would not be generally available.









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11:00-12:00 NEESHub Hands-On

Agenda:

- Account Registration
- Quick tour of 4 segments described earlier
- myneeshub
- Tool execution
 - opensees2 – Run the examples and create a new TCL simulation directory
 - openseeslab – Frank to demo
 - workspace – How to run the OpenSees binary.
- Data Transfer
 - Webdav
 - File import/export.
- Communication
 - Tickets
 - Questions and Answers
 - Wishlist
 - Sharing sessions
 - Tool Contribution and Development

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NEEShub
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Login Register About NEES Sitemap Feedback


Tools & Resources Learning & Outreach Project Warehouse Sites Collaborate Explore

Support



Earthquake Damage

Network for Earthquake Engineering Simulation (NEES) is a shared national network of 14 experimental facilities, collaborative tools, a centralized data repository, and earthquake simulation software. Together, these resources provide the means for collaboration and discovery in the form of advanced research based on experimentation and computational simulations of the ways buildings, bridges, utility systems, coastal regions, and geomatierials perform during seismic events. [Learn more >](#)



View Activity Map >

In the Spotlight

- Real-time Data Viewer: Provides an interface for viewing real-time, synchronized, streaming data from ... > Tools
- Workspace: Workspace - in Tools
- Hybrid Simulation and Shake-Table Tests on RC

Use NEEShub to...

- Access NEES projects- Project Warehouse
- Run simulators and other Tools
- Learn with earthquake data and simulators - NEES Academy
- Share research - Contribute Content

How-To Videos

Project Warehouse Overview

Project Warehouse Tutorial

Getting A Tool Session

NEES Videos on YouTube

Simulation of UJLCP and Failure in Steel Structure Phase 2

NEESdb Broadcast from News 10 Now

Harddisk RDV Demo

Events and Activities

View All | Submit an event

SEPTEMBER

S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30		

- 14th European Conference on Earthquake Engineering
- Large-Scale Validation of Seismic Performance of Bridge Columns

News and Announcements





View All | Subscribe to Newsletters

- NSF Dear Colleague Letter re: The Plans for the Future of Earthquake Engineering Research Infrastructure Support beyond 2014
21 Aug 2010
Dear Colleague Letter on Plans for the Future of Earthquake Engineering Research Infrastructure ...
- Completion of First Phase Testing of Negative Stiffness Concept Live Public Viewing Aug. 30, 9AM EDT
27 Aug 2010
NEESR Adapt-Struct project <http://www.ruf.rice.edu/~dsgr/> NEESR-Adapt-Struct will be completing ...
- The Great California Shakeout--October 21
24 Aug 2010
The Great Shakeout, which began in 2008 as the Great Southern California ShakeOut, is an effort to ...
- Research Experience for Undergraduates (REU) Program
24 Aug 2010
On August 16, 28 REU students met at University of Illinois to showcase their summer's work at ...

Latest Earthquake Reports


View All

- M 5.1, Andaman Islands, India region
Thursday, September 2, 2010 00:16:40 UTC
Thursday, September 2, 2010 05:46:40 AM at epicenter
Depth: 30.10 km (18.70 mi)
- M 5.0, near the east coast of Honshu, Japan
Wednesday, September 1, 2010 07:32:53 UTC
Wednesday, September 1, 2010 04:32:53 PM at epicenter
Depth: 39.40 km (23.86 mi)
- M 5.1, New Britain region, Papua New Guinea
Wednesday, September 1, 2010 01:46:21 UTC
Wednesday, September 1, 2010 11:46:21 AM at epicenter
Depth: 40.30 km (25.04 mi)

This site is supported by the George E. Brown, Jr. Network for Earthquake Engineering Simulation (NEES) Program of the National Science Foundation under Award Number CMMI-0927178

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Login Information

User Login: **REQUIRED** Combination of lowercase letters and numbers. No spaces or punctuation.

Password: **REQUIRED** Confirm Password: **REQUIRED**

- Passwords must contain at least 1 letter.
- Passwords must contain at least 1 number or punctuation mark.
- Passwords must be between 8 and 16 characters long.
- Passwords must contain more than 4 unique characters.
- Passwords must not contain easily guessed words.
- Passwords must not contain your name or parts of your name.
- New passwords must be different than the previous password (re-use of the same password will not be allowed for one (1) year).
- Passwords must be changed at least every 120 days.



NEEShub Registration Form

Contact Information

First Name: **REQUIRED** Middle Name: Last Name: **REQUIRED**

Valid E-mail: **REQUIRED** Confirm E-mail: **REQUIRED**

⚠ Important! You **must** confirm receipt of confirmation e-mail from support@neeshub.org in order to complete registration.


NEES Information

NEES Affiliation: **REQUIRED**


Terms & Conditions

REQUIRED Yes, I have read and agree to the [Terms of Use](#).

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Optional Information after you have account

Contact Information

Public profile (others may view your profile)

First name: Middle name: Last name:

Valid E-mail: Confirm E-mail:

⚠ Important! If you change your E-mail address you **must** confirm receipt of the confirmation e-mail in order to re-activate your account.

Website:

Phone:

NEES Information

User Category: **REQUIRED**

NEES Affiliation: **REQUIRED**

Relationship to NEES:

What are your areas of interest?

Students

Educators

Researchers

Software Development

K-12 (Pre-College)

Undergraduate

Graduate / Professional

Personal Information

Bio:

Demographics

Are you a Legal Citizen or Permanent Resident of the US? Yes No

Citizen or Permanent Resident of:

Do you Currently Live in the US? Yes No

Currently Living in:

State of Residence:

Sex: Male Female Do not wish to reveal

Disability: Yes No (none) Do not wish to reveal

Racial Background: Select one or more that apply.

American Indian or Alaska Native

Asian

Black or African American





Native Hawaiian or Other Pacific Islander

White

Do not wish to reveal

Members picture

Upload (any existing image will be replaced)

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OpenSees

The Tools (and Resources) Trifold

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675 New Messages
Gregory P. Rodgers (progrgs)

Tools & Resources | Learning & Outreach | Project Warehouse | Sites | Collaborate | Explore

You are here: Home > Tools & Resources > Tools

Resources: Tools

Tag: [All] | Concepting (1) | design (1) | Earthquake Engineering (1) | EOT (8) | inDEED Example (2) | NEEScomm (2) | simulation (2) | truss analysis (2) | Virtual Laboratory (4) | visualization (3)

Resources: Sort by Title

- FileToRbnd
- GOYA-A. Truss Analysis
- GOYA-C. Beam Analysis
- GOYA-F4. Multi-Story Frame Analysis
- GOYA-F5. Three-Hinged Frame Analysis
- GOYA-I. Moment of Inertia Analysis
- GOYA-N. Cantilever Beam Analysis
- GOYA-S. Simply Supported Beam Analysis
- GOYA-T. Introductory Truss Analysis
- inDEED
- OpenSees 2.2.1
- OpenSees Laboratory
- OpenSees Source Code / Not for Direct ...
- Real-time Data Viewer

Info

OpenSees 2.2.1

OpenSees is a software framework for developing applications to simulate the performance of structural and geotechnical systems subjected to earthquakes. [Learn more >](#)

Launch Tool →

0 Citation(s)

1 question (Ask a question)

0 review(s) (Review this)

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OpenSees

NEES - Resources: Tools: OpenSees 2.2.1: Session: 10153 "OpenSees 2.2.1" - Mozilla Firefox: IBM Edition

File Edit View History Bookmarks Tools Help

https://nees.org/tools/opensees2/session/10153

OpenSees Days 2010 - Eventbrite

NEES - Res...

OpenSees

DO IT

Problem launching job:
0child process exited abnormally

ONE BAY ONE STORY EXAMPLE

```
cli
peerNGA
sine
sine_no_gui
```

Choose Simulation Directory: sine

What do you want to do?: SIMULATE

Which Unix Editor do you prefer?: vi

NEESComm OpenSees Simulation Manager

nano
vi
gedit

SIMULATE

EDIT main tcl

Create new directory

Abort

Share session with (enter usernames separated by spaces or commas): Read-Only? (S

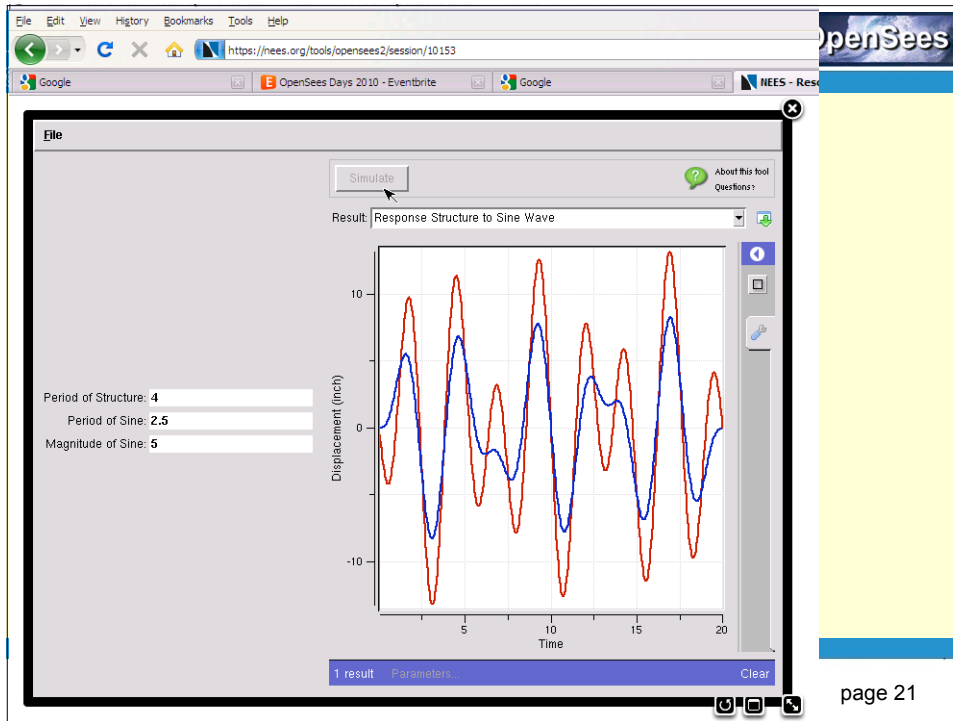
OpenSees developer interface

Used to develop models and GUIs.

Five examples will be placed in your HOME directory the first time you start tool

This interface will be extended for batch submission.

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OpenSees

NEES - Resources: OpenSees 2.2.1 - Mozilla Firefox: IBM Edition

https://nees.org/resources/opensees2

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675 New Messages Gregory P. Rodgers (prodders)

Tools & Resources Learning & Outreach Project Warehouse Sites Collaborate Explore

You are here: Home > Tools & Resources > Tools > OpenSees 2.2.1 > About

OpenSees 2.2.1 [edit](#)

By Gregory P. Rodgers

OpenSees is a software framework for developing applications to simulate the performance of structural and geotechnical systems subjected to earthquakes.

Launch Tool →

Version 2.2.1-30 - published on 27 Jul 2010

This tool is closed source.

[View All Supporting Documents](#)

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1 question (Ask a question)

0 review(s) (Review this)

Add to your favorites!

1 wish(es) (Add a new wish)

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SEE ALSO

No results found.

About Citations Questions Reviews Versions Wish List Supporting Docs

Description

OpenSees

```
#set gravity loads const
loadConst -time -0.01
#create load pattern

```

OpenSees is a framework for developing applications to simulate the performance of structural and geotechnical systems subjected to earthquakes.

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OpenSees

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OpenSees

NEES - Resources: OpenSees Laboratory - Mozilla Firefox: IBM Edition

https://nees.org/resources/openseeslab

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You are here: Home » Tools & Resources » Tools » OpenSees Laboratory » About

OpenSees Laboratory [edit](#)

By Frank McKenna

Simulation Tools for Earthquake Engineering using OpenSees

Launch Tool →

Version 1.0-43 - published on 26 Aug 2010

Open source: [license](#) | [download](#)

[View All Supporting Documents](#)

0 Citation(s)
0 questions (Ask a question)
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Add to your favorites!
0 wish(es) (Add a new wish)

Share: [f](#) [t](#) [g+](#)

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Description: This set of simulation tools has been developed for use with the [OpenSees](#) software. There are 3 basic tool types: 1) Tools for submitting [OpenSees](#) scripts to [OpenSees](#) interpreters running on sequential and NSF Teragrid resources. 2) Tools for Educational use to instruct students on the response of structures. 3) Useful Tools for performing practical tasks.

These tools will be updated constantly.

Any questions, comments, difficulties should be directed to openseessupport@berkeley.edu.

powered by OpenSees

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OpenSees

Using Windows Webdav to access your HOME directory on the NEEShub

opensees2

File Edit View Favorites Tools Help

Back Forward Stop Search Folders

Address: https://nees.org/webdav/opensees2

Name	Internet Address	Size	Type	Modified
[_SIM_CHOOSER]	https://nees.org/webdav/opensees2/_SIM_...		Web Folder	6/15/2010 5:31 PM
cli	https://nees.org/webdav/opensees2/cli		Web Folder	6/7/2010 4:10 PM
ONE_BAY_ONE_STORY_EXAMPLE	https://nees.org/webdav/opensees2/ONE_B...		Web Folder	8/10/2010 4:06 PM
peerNGA	https://nees.org/webdav/opensees2/peerNGA		Web Folder	6/7/2010 4:10 PM
sine	https://nees.org/webdav/opensees2/sine		Web Folder	9/1/2010 10:12 PM
sine_no_gui	https://nees.org/webdav/opensees2/sine_n...		Web Folder	6/7/2010 4:10 PM
xxxx	https://nees.org/webdav/opensees2/xxxx		Web Folder	6/15/2010 5:30 PM

Other Places: webdav on neeshub.org, My Documents, Shared Documents, My Network Places

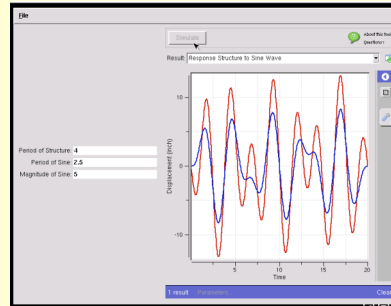
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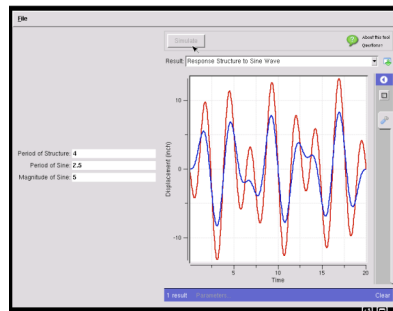
How to Build A GUI with OpenSees, Rappture, and TCL

- Build an xml file (tool.xml) that defines the driver for your simulation model.
- Modify tcl script to read and write values from a “driver”.


tool.xml + sine.tcl →




```
lappend auto_path /apps/rappture/current/lib
pa"
# c <?xml version="1.0"?>
# c <run>
if {
  <tool>
    <id>opensees2</id>
    <name>OpenSees 2.2.1</name>
    <about>Press Simulate to view results.</about>
    <command>
      /apps/opensees2/current/bin/OpenSees @tools/sine.tcl @driver 2>stderr.out
    </command>
    <tool>
      <input>
        <number id="periodStruct">
          <about>
            <label>Period of Structure</label>
            <description>Period of Structure</description>
          </about>
          <units>
            <min>0.001</min>
            <max>5.0</max>
            <default>4.0</default>
            <current>4.0</current>
          </number>
          <number id="periodSine">
            <about>
              <label>Period of Sine</label>
              <description>Period of Input Sine Motion</description>
            </about>
            <units>
              <min>0.001</min>
              <max>10</max>
              <default>2.5</default>
              <current>2.5</current>
            </number>
            <number id="magnitude">
              <about>
                <label>Magnitude of Sine</label>
                <description>Magnitude of Input Sine Motion</description>
              </about>
              <units>
                <min>0.0</min>
                <max>10</max>
                <default>5.0</default>
                <current>5.0</current>
              </number>
            </input>
          </run>
        }
      }
    }
  }
}
if {$patternType == "UniformExcitation"} {
  >output.curve(multi$patternType).about.group "Response Structure to Sine Wave"
  >output.curve(multi$patternType).about.label "Steady State Response"
  >output.curve(multi$patternType).about.description "
  n example of a multiple curves on the same plot."
}
}mExcitation 1 1 -accel $accelSeries -vel0 $vel0
```



Example: \$HOME/opensees2/sine



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```


lappend auto_path /apps/rapture/current/lib
package require Rapture
# open the XML file containing the run parameters
set driver [Rapture::library [lindex $argv 0]]
if {[Rapture::libraryIsValid $driver] != 1} {
    error "Driver is not a valid Rapture Library!"
}
set periodStruct [Driver get input.(periodStruct).current]
set periodSine [Driver get input.(periodSine).current]
set mag [Driver get input.(magnitude).current]
set maxT 20.0
if {$periodSine > $periodStruct} {
    set dT [expr $periodSine/100.0]
} else {
    set dT [expr $periodStruct/100.0]
}
set g 386.4
set Pi [expr 2.0 * asin(1.0)]
set L 10.0
set A 1.0;
set m 1.0;
set wSine [expr 2.0 * $Pi / $periodSine]
set wStruct [expr 2.0 * $Pi / $periodStruct]
set K [expr $wStruct * $wStruct * $m]
set E [expr $L * $K / $A]
set vel0 [expr -1.0*$wSine*$mag]

foreach patternType {MultipleSupport UniformExcitation} {
    wipe
    model basic -ndm 1 -ndf 1
    node 1 0.0
    node 2 $L -mass $m
    uniaxialMaterial Elastic 1 SE
    element truss 1 1 2 $A 1
    set dispSeries "Sine 0 $maxT $periodSine -factor $mag"
    set accelSeries "Sine 0 $maxT $periodSine -factor [expr -1.0 * $wSine * $wSine * $mag]"
    if {$patternType == "MultipleSupport"} {
        set type 1
        Driver put output.curve(multi$patternType).about.group "Response Structure to Sine Wave"
        Driver put output.curve(multi$patternType).about.label "Total Response"
        Driver put output.curve(multi$patternType).about.description \
            "This is an example of a multiple curves on the same plot."
        pattern MultipleSupport 1 {
            groundMotion 1 Series-disp $dispSeries
            imposedSupportMotion 1 1 1
        }
    }
    if {$patternType == "UniformExcitation"} {
        Driver put output.curve(multi$patternType).about.group "Response Structure to Sine Wave"
        Driver put output.curve(multi$patternType).about.label "Steady State Response"
        Driver put output.curve(multi$patternType).about.description \
            "This is an example of a multiple curves on the same plot."
        set type 2
        pattern UniformExcitation 1 1 -accel $accelSeries -vel0 $vel0
        fix 1 1
    }
    constraints Transformation
    integrator Newmark 0.5 0.25
    system ProfileSPD
    algorithm Linear
    numberer RCM
    constraints Transformation
    analysis Transient
    Driver put output.curve(multi$patternType).xaxis.label "Time"
    Driver put output.curve(multi$patternType).yaxis.label "Displacement"
    Driver put output.curve(multi$patternType).yaxis.units "Inch"
    set t 0.0
    while {$t < $maxT} {
        analyze 1 $dT
        set time [getTime]
        set d [nodeDisp 2 1]
        set progress [expr ($t/$maxT)*100]
        Rapture::Utils::progress $progress -msg "Iterating"
        Driver put -append yes output.curve(multi$patternType).component.xy "$time $d in"
        set t [expr $t + $dT]
    }
}
# save the updated XML describing the run...
Rapture::result $driver
exit 0


```

sine.tcl

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OpenSees in nees.org

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 - <http://nees.org/resources/???>

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