

OpenSees Resources

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OpenSees User Workshop
8 September 2008

OpenSees



NEESit

OpenSees user resources

- <http://opensees.berkeley.edu/>
 - Both an executable version and the source code are publicly available
 - User Command Manual
 - Examples Manual
 - e-mail technical support
 - The OpenSees Community Forum
- Annual User Workshops

<http://opensees.berkeley.edu/>

The screenshot shows the OpenSees website homepage. At the top, there is a navigation bar with links for HOME, USER, DEVELOPER, PROJECTS, SUPPORT, PARALLEL, and SITE MAP. Below this, there are several sections: 'OpenSees Days 2008' with information about the event at UC Berkeley; 'OpenSees 2.0.0 Released' with a link to the binary; 'Parallel Version Released' with information about parallel processing; and 'Welcome' with a message from the website. A 'Register' section is also visible. The footer includes logos for OpenSees and NEESit.

Silvia Mazzoni, OpenSees User Workshop, 2008

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Download executable

OpenSees Executable Distribution

Current version is: 2.0.0

Your last download was on Thu Jul 17 08:18:50 2008, and the version was 2.0.0.

OpenSees executables for Windows 98/2000/NT/XP/Vista are available for download. The current version of OpenSees has been tested and is generally stable. However, users may encounter problems when running a new problem for the first time. For that reason we strongly encourage you to participate in the various [message boards](#) hosted by OpenSees. And **please** report any **bugs** you find! That, of course, is the whole reason we make these binaries available.

OpenSees uses [Tcl/Tk](#), a general purpose scripting language that we have extended with commands for OpenSees. It is necessary to download a DLL for the Tcl/Tk interpreter.

The first step is download the two files below. The first file a zip file containing the OpenSees executable. The second file is a self-installing executable for Tcl/Tk.

Note that for those of you who have downloaded before, YOU WILL HAVE TO INSTALL Tcl/Tk LIBRARIES AND HEADER FILES AGAIN. This is because we have upgraded to Tcl/Tk Version 8.4.6

DOWNLOAD Windows Binaries		
Release_2.0.0	OpenSees2.0.0.exe	tcl/tk 8.4.6

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OpenSees: Open Source

Resources for Developers

Welcome! This page contains some useful information for you brave souls who wish to get involved in the code development of OpenSees.

Documentation

Before you begin and for when you get stuck there is always the documentation. For new users to OpenSees, have a look at the primers to get yourselves more familiar with the overall design. For you programmers who need to understand the inner workings of the classes have a look at the [Class Specifications](#).

Download

Download the source via FTP from our server. Details are on the [Download](#) page. Source drops to the FTP server usually occur monthly!

Builds

Look at the build instructions to find out how to compile this beast on your platform. If you are working on a new platform and get the beast to run,

Browse the Source Code

Browse the up-to-the-minute latest version of the source code online.

CVS

Those doing active development can check out the latest source using CVS. This is the preferred method, as it lets you get up-to-the-minute changes and merge them with your own. Details are on our [CVS](#) page.

Contribute

To contribute code, submit your changes to following the [instructions](#). If the code changes are approved they'll be committed.

OpenSees

Current directory: [local](#) / [OpenSees](#) / [SRC](#)

File	Rev.	Age	API	Last log entry
Parent Directory				
Attric/ [Don't hide]				
actor/				
analysis/				
convergenceTest/				
coordTransformation/				
damage/				
database/				
doc/				
domain/				
element/				
graph/				
handler/				
java/				
machine/				
material/				
matrix/				
modelbuilder/				
nDarray/				
optimization/				
package/				
recorder/				
reliability/				
remote/				

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download documentation

The screenshot shows the OpenSees website with a navigation menu at the top: HOME, USER, DEVELOPER, PROJECTS, SUPPORT, SITE MAP. Below the menu, there are several sections: 'Resources for Users' with a link to <http://opensees.berkeley.edu/>, 'Documentation' with a book icon, 'Download' with a download icon, 'Examples' with a book icon, 'Tools' with a gear icon, and 'Message board' with a speech bubble icon. There are also links for 'User Pages' and 'Documentation' highlighted in yellow. The footer contains the text: 'opensees-support @ berkeley.edu ©2006, UC Regents Supported by the National Science Foundation'.

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download User Manual

OpenSees

HOME USER DEVELOPER PROJECTS SUPPORT SITE MAP

Capabilities Docs Examples Message Board Download Bug Report Tools

HOME

MESSAGE BOARD

USER DOC

DOWNLOAD

SOURCE CODE

BUG REPORT

Search

To cust quick: [Site](#)

PEER

User Documentation

Welcome! This page contains links to existing primers on how to use both Tcl/Tk and OpenSees.

- [Tcl/Tk Primer\(external link\)](#) is a html document providing a quick introduction to programming in Tcl/Tk.
- OpenSees Users Manual (opens in new window).** This is a html document providing the syntax and description of OpenSees commands. ([MS Word](#), [windows help file](#) for the manual.)
- [OpenSees Examples Manual \(opens in new windows\)](#). This is a html document providing descriptive examples of basic OpenSees script files.
- [OpenSees Examples Quick Reference Guide](#) is a pdf document providing a list of the commands available in OpenSees. ([postscript file](#))

OpenSees Users Manual. This is a html document providing the syntax and description of OpenSees commands. (MS Word, Offline Windows).

<http://opensees.berkeley.edu/OpenSees/manuals/usermanual/>

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OpenSees User Manual

A document providing the syntax and description of OpenSees commands in 3 formats:

- 1. HTML Manual** - on-line HTML document, residing on OpenSees server. Always going to be the most current.
- 2. MS Word** - downloadable and printable Word document in PDF format
- 3. Offline Windows** - downloadable .chm file. it is similar to the HTML format, but the file resides on your computer.

1. HTML on-line format



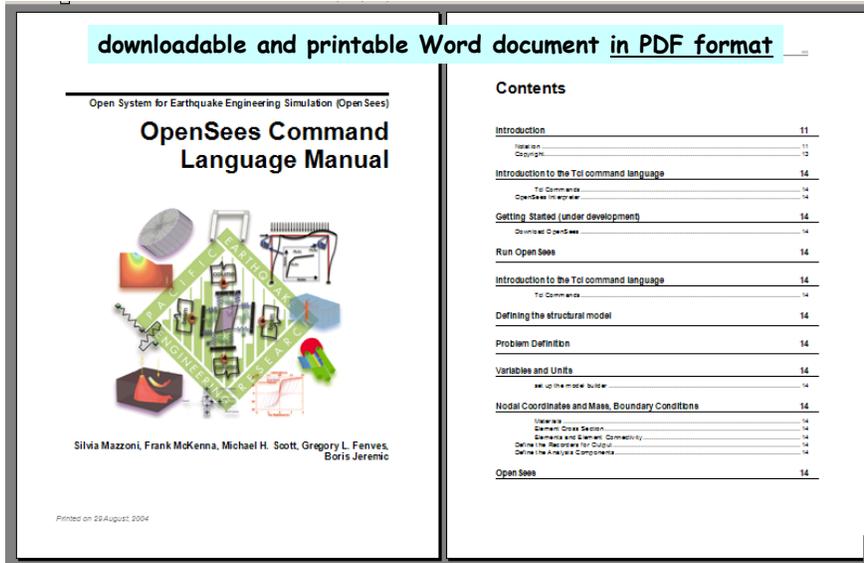
on-line HTML document, residing on OpenSees server.
Always going to be the most current.

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2. MS Word format -- PDF

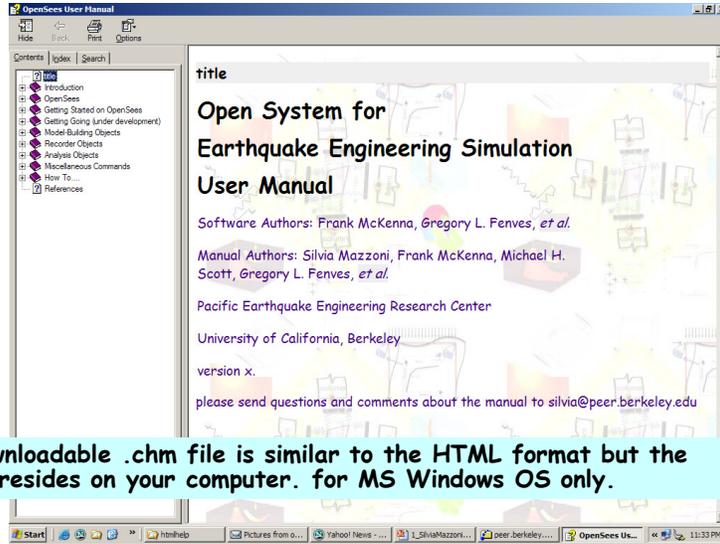
downloadable and printable Word document in PDF format



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3 .chm file for MS Windows

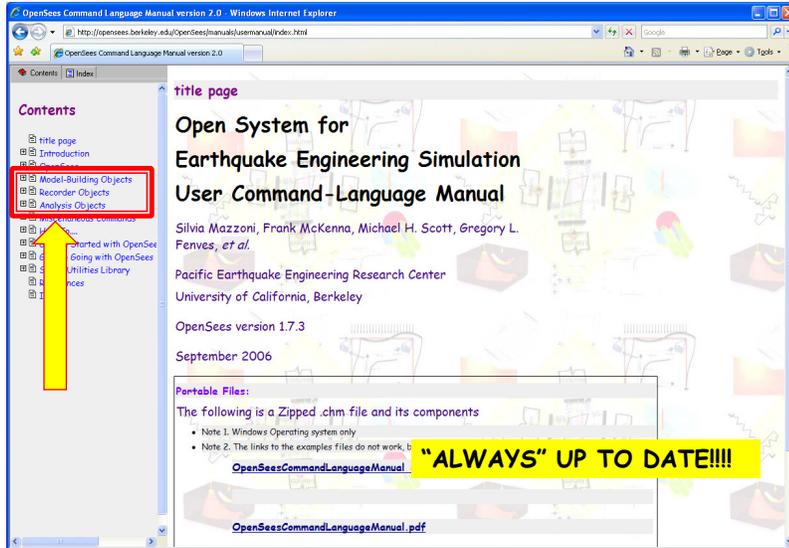


the downloadable .chm file is similar to the HTML format but the file resides on your computer. for MS Windows OS only.

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use HTML



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OpenSees

- OpenSees
 - ModelBuilder Object is responsible for building the objects in the model and adding them to the domain
 - Recorder Object monitors user-specified objects of the model during the analysis
 - Analysis Object is responsible for performing the analysis
 - *Also in the OpenSees Nomenclature: (Domain Object is responsible for storing the objects created by the ModelBuilder object and for providing the Analysis and Recorder objects access to these objects)*

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Model-Building Objects

- model Command
- node Command
- mass Command
- Constraints objects
- uniaxialMaterial Command
- nDMaterial Command
- section Command
- element Command
- block Command
- region Command
- Geometric Transformation Command
- Time Series
- pattern Command

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Recorder Objects

- Node Recorder
- EnvelopeNode Recorder
- MaxNodeDisp Recorder
- Drift Recorder
- Element Recorder
- EnvelopeElement Recorder
- Display Recorder
- Plot Recorder
- playback Command



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Analysis Objects

- constraints Command
- numberer Command
- analysis Command
- algorithm Command
- integrator Command
- system Command
- test Command
- analyze Command
- rayleigh command
- eigen Command
- dataBase Commands

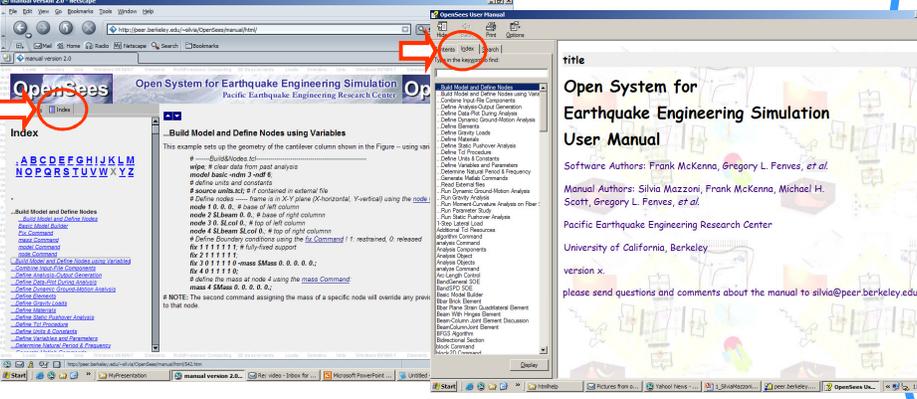


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note

- you can also use the index tab to search specific commands



The screenshot shows the OpenSees User Manual interface. The 'Index' tab is active, displaying an alphabetical index. A red circle highlights the 'Index' tab, and another red circle highlights the search results for 'Build Model and Define Nodes using Variables'. The search results show the following text:

```
# --- Build Model and Define Nodes using Variables
This example sets up the geometry of the cantilever column shown in the Figure -- using van
widge. # clear data from past analysis
model basic -ndm 3 -ndf 6
# define units and constants
# source units are # contained in external file
# Define nodes --- frame is in X-Y plane (X-horizontal, Y-vertical) using the code:
node 1 0.0 0.0 # base of left column
node 2 5.0 0.0 # top of left column
node 3 5.0 5.0 # base of right column
node 4 5.0 10.0 # top of right column
# Define Element conditions using the El_Command / f: restrained, 0: released
el 1 1 1 1 1 # fully-fixed support
el 2 1 1 1 1 0
el 3 0 1 1 1 0
# define the mass of node 2 using the mass Command
mass 2 5000 0.0 0.0 0.0
# NOTE: This second command assigning the mass of a specific node will override any previ
to that node.
```

The title page of the manual is also visible, showing the title 'Open System for Earthquake Engineering Simulation User Manual' and authors: Frank McKenna, Gregory L. Fenves, et al. and Silvia Mazzoni, Frank McKenna, Michael H. Scott, Gregory L. Fenves, et al.

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OpenSees Examples Manual

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OpenSees Examples Manual

Example	Objectives and Characteristics	Model Types	Analysis Types
Example 1a. Elastic Cantilever Column	<ul style="list-style-type: none"> overview of basic OpenSees input structures coordinate system elements, element connectivity, node, mass, rigid loads, etc. two-node, one element 	<ul style="list-style-type: none"> elastic elements 	<ul style="list-style-type: none"> static pushover analysis dynamic earthquake-input analysis
Example 1b. Elastic Portal Frame	<ul style="list-style-type: none"> two element types distributed element loads 	<ul style="list-style-type: none"> elastic elements 	<ul style="list-style-type: none"> static pushover analysis dynamic earthquake-input analysis
Example 2a. Elastic Cantilever Column with variables	<ul style="list-style-type: none"> introduce variable define & use 	<ul style="list-style-type: none"> elastic element 	<ul style="list-style-type: none"> static pushover analysis dynamic earthquake-input analysis

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OpenSees Examples Manual

The screenshot shows the 'Simple Nonlinear-Analysis Example' page. A red box highlights the text 'Tcl Variables' and 'Nonlinear Models'. The page content includes:

- Example 2a. Elastic Cantilever Column with variables**
 - introduce variables, define & use
 - elastic element
 - static pushover analysis
 - dynamic earthquake-input analysis
- Example 2b. Nonlinear Cantilever Column: Uniaxial Inelastic Section**
 - first example of nonlinear model, set nonlinearity at section level
 - nonlinearBeamColumn element
 - uniaxial section
 - static pushover analysis
 - dynamic earthquake-input analysis
- Example 2c. Nonlinear Cantilever Column: Uniaxial Materials in Fiber Section**
 - set nonlinearity at material level
 - material stress-strain response is embedded into fiber section
 - reinforced-concrete fiber section
 - nonlinearBeamColumn element
 - uniaxial material
 - fiber section (Reinforced-concrete fiber section)
 - static pushover analysis
 - dynamic earthquake-input analysis

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OpenSees Examples Manual

The screenshot shows the '2D Structural Modelling & Analysis Examples' page. A red box highlights the text 'Units' and 'Tcl Procedures'. The page content includes:

- Example 3. Cantilever Column with units**
 - units, defined and used (they will be used in all subsequent examples)
 - reprints model building and analysis file
 - introduce PDelta effects (or not)
 - elastic elements
 - uniaxial inelastic section
 - fiber section (Reinforced-concrete fiber section)
 - Linear, PDelta or Conformational Transformation
 - static pushover analysis
 - dynamic earthquake-input analysis (uniform excitation)
- Example 4. Portal Frame**
 - use previously-defined procedure to simplify input
 - introduce non-analysis type
 - introduce procedure to read database input section file (data with unit in first line)
 - elastic elements
 - uniaxial inelastic section
 - uniaxial fiber section (Reinforced-concrete fiber section)
 - Linear, PDelta or Conformational Transformation
 - static pushover analysis
 - static reversed cyclic analysis
 - dynamic one-way input analysis (uniform excitation)
 - dynamic earthquake-input analysis (uniform excitation)
 - dynamic two-way input analysis (multiple-support excitation)
 - dynamic bi-directional earthquake input analysis (uniform excitation)
- Example 5. 2D Frame, 3-story, 3-bay, Reinforced-Concrete Section & Steel W-Section**
 - 2D Frame of fixed geometry, 3-story, 3-bay
 - nodes and elements are defined manually, one by one
 - Reinforced-Concrete Section
 - Steel W-Section
 - uniaxial inelastic section
 - static pushover analysis
 - static reversed cyclic analysis
 - dynamic one-way input analysis (uniform excitation)
 - dynamic earthquake-input analysis (uniform excitation)

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OpenSees Examples Manual

The screenshot displays the 'OpenSees Examples Manual' website in a browser window. The page is titled '2D Frame analysis' and 'W-Section Procedure'. It features a 'Contents' sidebar on the left and a main content area with several examples. A red box highlights the '2D Frame analysis' and 'W-Section Procedure' text. The examples listed include:

- Example 3: 2D RC Cantilever
- Example 4: 2D RC Portal Frame
- Example 5: 2D Frame - 3-story, 3-bay (RC & W-section)
- Example 6: Generic 2D Frame, N-story, N-bay (RC & W-section)

The main content area also includes a table of 'Objectives and Characteristics' and 'Model Types' for various analysis types, such as static pushover analysis, static reversed cyclic analysis, and dynamic one-way input analysis.

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OpenSees Examples Manual

The screenshot displays the 'OpenSees Examples Manual' website in a browser window. The page is titled '3D Frame analysis'. It features a 'Contents' sidebar on the left and a main content area with several examples. A red box highlights the '3D Frame analysis' text. The examples listed include:

- Example 7: 3D Frame, 3-story, 3-bay, 3-bay, Reinforced-Concrete Section & Steel W-Section
- Example 8: generic 3D Frame, NStory, NBayX, NBayZ, Reinforced-Concrete Section & Steel W-Section

The main content area also includes a table of 'Objectives and Characteristics' and 'Model Types' for various analysis types, such as static pushover analysis, static reversed cyclic analysis, and dynamic one-way input analysis.

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Within an Example

Model Building

Example 4. Portal Frame -- Model Building

- define model, define & apply gravity

Elastic Element
Effective axial and flexural stiffnesses are defined at the element level

Ex4.Portal2D.build.ElasticElement.tcl

- Build model - nodes, supports, elements, etc.
- elasticBeamColumn elements
- elasticBeamColumn elements
- define & apply gravity load
- LibUnits.tcl

Distributed Plasticity Element, Uniaxial Section
Axial and flexural stiffness/strength are defined independently at the section level

Ex4.Portal2D.build.InelasticSection.tcl

- Build model - nodes, supports, elements, etc.
- uniaxial inelastic section (moment-curvature)
- nonlinear beam-column elements
- define & apply gravity load
- LibUnits.tcl

Distributed PlasticityElement, Fiber Section
The section is broken down into fibers where uniaxial materials are defined independently. The program calculates flexural and axial stiffness/strength by integrating strains across the section.

Ex4.Portal2D.build.InelasticFiberSection.tcl

- Build model - nodes, supports, elements, etc.
- uniaxial inelastic material (stress-strain)
- fiber section
- nonlinear beam-column elements
- define & apply gravity load
- LibUnits.tcl

Analysis

Example 4. Dynamic Lateral Load Analysis

- Define & apply lateral load

Dynamic Uniform Sine-Wave Ground Motion

- Uniform acceleration input
- Same acceleration input at all nodes restrained in specified direction

Ex4.Portal2D.analyze.Dynamic.sine.Uniform.tcl

- LibUnits.tcl
- OpenSees.tcl
- BeamRC2D.tcl
- IBS1240.tcl

Dynamic Uniform Earthquake Ground Motion (typical)

- Earthquake (from file) acceleration input
- Same acceleration input at all nodes restrained in specified direction

Ex4.Portal2D.analyze.Dynamic.EQ.Uniform.tcl

- LibUnits.tcl
- OpenSees.tcl
- BeamRC2D.tcl
- IBS1240.tcl

Dynamic Multiple-Support Sine-Wave Ground Motion

- Different displacement input
- Different displacements are specified at particular nodes in specified direction

Ex4.Portal2D.analyze.Dynamic.sine.multipleSupport.tcl

- LibUnits.tcl
- OpenSees.tcl
- BeamRC2D.tcl
- IBS1240.tcl

Dynamic Multiple-Support Earthquake Ground Motion

- Earthquake (from file) displacement input
- Different displacements are specified at particular nodes in specified direction

Ex4.Portal2D.analyze.Dynamic.EQ.multipleSupport.tcl

- LibUnits.tcl
- OpenSees.tcl
- BeamRC2D.tcl
- IBS1240.tcl

Dynamic Bidirectional Earthquake Ground Motion

- Earthquake (from file) displacement input
- Different displacements are specified at particular nodes in specified direction

Ex4.Portal2D.analyze.Dynamic.EQ.bidirect.tcl

- LibUnits.tcl
- OpenSees.tcl
- BeamRC2D.tcl
- IBS1240.tcl

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trying to redirect to:

OpenSees Community Forum

The screenshot shows the OpenSees website header with navigation links: HOME, USER, DEVELOPER, PROJECTS, SUPPORT, SITE MAP. Below the header, there are links for Capabilities, Docs, Examples, Message Board, Download, Bug Report, and Tools. The main content area is titled "OpenSees Community Forums" and includes a user profile for "silvia" with options to Register, Log out, Profile, Memberlist, FAQ, and Search. A list of forum categories is displayed with their respective topic and post counts and the date of the last post.

Forum	Topics	Posts	Last Post
OpenSees.exe Users Forum for OpenSees users to post questions, comments, etc. on the use of the OpenSees interpreter, OpenSees.exe. Moderator: silvia	1873	6750	Mon Aug 25, 2008 10:14 am TWI →
Soil Modelling A forum dedicated to users with questions regarding soil materials and elements.	16	44	Mon Jul 21, 2008 7:41 pm raeger →
Framework For developers writing C++, Fortran, Java, code who have questions or comments to make. Moderator: silvia	233	829	Fri Aug 15, 2008 11:42 pm nealae →
Parallel Processing This forum is for issues related to parallel processing and OpenSees using the new interpreters OpenSeesSP and OpenSeesMP	14	33	Wed Jul 23, 2008 10:11 pm hongqi →
Useful Scripts. If you have a script you think might be useful to others post it here. Hopefully we will be able to get the most useful of these incorporated in the manuals. Moderator: silvia	27	78	Tue Aug 12, 2008 12:15 am khiliga →
Documentation For posts concerning the documentation, errors, omissions, general comments, etc. Moderator: silvia	127	352	Mon Aug 04, 2008 8:22 am penncorp66 →
Future Directions A forum dedicated to the future direction of OpenSees, i.e. what would you like, what do you need. Moderator: silvia	29	104	Mon Aug 18, 2008 1:18 am Andrew →

<http://opensees.berkeley.edu/community/index.php>

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seven forum categories

Forum	Topics	Posts	Last Post
OpenSees			
OpenSees.exe Users Forum for OpenSees users to post questions, comments, etc. on the use of the OpenSees interpreter, OpenSees.exe. Moderator: silvia	1873	6750	Mon Aug 25, 2008 10:14 am TWI →
Soil Modelling A forum dedicated to users with questions regarding soil materials and elements.	16	44	Mon Jul 21, 2008 7:41 pm raeger →
Framework For developers writing C++, Fortran, Java, code who have questions or comments to make. Moderator: silvia	233	829	Fri Aug 15, 2008 11:42 pm nealae →
Parallel Processing This forum is for issues related to parallel processing and OpenSees using the new interpreters OpenSeesSP and OpenSeesMP	14	33	Wed Jul 23, 2008 10:11 pm hongqi →
Useful Scripts. If you have a script you think might be useful to others post it here. Hopefully we will be able to get the most useful of these incorporated in the manuals. Moderator: silvia	27	78	Tue Aug 12, 2008 12:15 am khiliga →
Documentation For posts concerning the documentation, errors, omissions, general comments, etc. Moderator: silvia	127	352	Mon Aug 04, 2008 8:22 am penncorp66 →
Future Directions A forum dedicated to the future direction of OpenSees, i.e. what would you like, what do you need. Moderator: silvia	29	104	Mon Aug 18, 2008 1:18 am Andrew →

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very busy message board

OpenSees.exe Users

Moderator: [silvia](#)

Users browsing this forum: [silvia](#)

Goto page 1, 2, 3 ... 36, 37, 38 Next



The OpenSees Community Forum Index -> OpenSees.exe Users

Mark all topics read

Topics	Replies	Author	Views	Last Post
Sticky: First Public Release of BuildingTcl	7	silvia	466	Fri Aug 22, 2008 5:51 am hresquivelo ↕
Sticky: OpenSees Days 2008, 8-9 September. Registration open	4	silvia	433	Thu Aug 14, 2008 2:40 pm silvia ↕
Is consecutive multiple analysis possible in OpenSees?	8	TWI	130	Mon Aug 25, 2008 10:14 am TWI ↕
axial load in pushover analysis and IDA method	1	sheng0122	55	Mon Aug 25, 2008 9:46 am sil_opensees ↕
how to move the load pattern?	5	zhmkitten	60	Mon Aug 25, 2008 8:03 am zhmkitten ↕
dynamic analysis of rocking frame	1	ca493	20	Mon Aug 25, 2008 6:35 am silvia ↕
fracture modeling	7	ca493	160	Sun Aug 24, 2008 5:57 pm ca493 ↕
Sorry...	4	jk295	136	Sun Aug 24, 2008 10:29 am silvia ↕
eigenvalue analysis error	2	mrathore	55	Fri Aug 22, 2008 4:08 pm Pravaq Savani ↕
using scale factor	6	jk295	74	Fri Aug 22, 2008 12:48 pm jk295 ↕
Model of tallbuilding in opensees	1	dinochen1983	45	Fri Aug 22, 2008 10:42 am silvia ↕
nonlinear static analysis	1	susan	28	Fri Aug 22, 2008 10:38 am silvia ↕

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Annual User Workshop: OpenSees Days 2008

- **8 September: OpenSees User Workshop**

The annual one-day workshop on how to use OpenSees. This workshop is intended for beginning and intermediate users. This workshop will introduce users to the tcl scripting language, and basic modeling and analysis techniques using OpenSees.

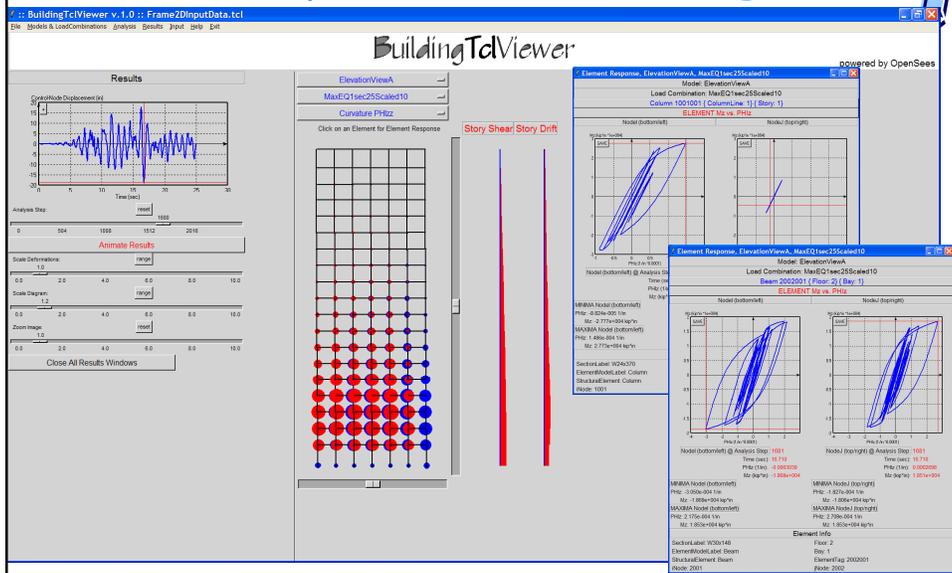
- **9 September: OpenSees Modeling Workshop**

A one-day workshop with presentations by current OpenSees users on various modeling techniques. Models discussed will include reinforced concrete, steel, soils, and soil-structure interaction. Users and developers at all levels are encouraged to attend the workshop.

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GUIs are possible: BuildingTcl



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Questions,
or statements:

The OpenSees Community Forum:

<http://opensees.berkeley.edu/community/index.php>

which can be accessed from:

<http://opensees.berkeley.edu>

