Uploading Data for TPV6 and TPV7
Revised October 14, 2007

<u>**Contents:**</u>

1   Introduction

We will be uploading data to our new SCEC code validation web server at this address:

`http://scecdata.usc.edu/cvws/cgi-bin/cvws.cgi`

You will each receive a username and password for logging in to the server.

You can now upload contour plot files directly to the server. You do not have to submit contour plot files by email any more.

After uploading your data, you can use the server to graph your data, and compare your results to the results of other modelers.

You need to upload two kinds of files:

- Time series files, which give displacements, velocities, and stresses for each station at each time step.

- Contour plot files, which give the fault rupture contour plots at intervals of 0.5 seconds.

Section 2 describes the time series file format, and gives an example of a time series file. Section 3 describes the contour plot file format, and gives an example of a contour plot file. Section 4 has instructions for uploading your files to the server.

Direct questions to Michael Barall.

2   Time Series Data Files

For TPV6 and TPV7, we are submitting time series data in a form very similar to what we have used in the past.

Time series data is supplied as a set of ASCII files. You need to supply one file for each station. There are 10 stations, as follows. Refer to `faultstationsTPV67.pdf` for a diagram of station locations.

Stations for TPV6 and TPV7	
Station Name	**Location**
`farst-120dp000`	Far side of fault, -12.0 km along strike, 0 km depth.
`farst000dp000`	Far side of fault, 0 km along strike, 0 km depth.
`farst120dp000`	Far side of fault, 12.0 km along strike, 0 km depth.
`farst-120dp075`	Far side of fault, -12.0 km along strike, 7.5 km depth.
`farst120dp075`	Far side of fault, 12.0 km along strike, 7.5 km depth.
`nearst-120dp000`	Near side of fault, -12.0 km along strike, 0 km depth.
`nearst000dp000`	Near side of fault, 0 km along strike, 0 km depth.
`nearst120dp000`	Near side of fault, 12.0 km along strike, 0 km depth.
`nearst-120dp075`	Near side of fault, -12.0 km along strike, 7.5 km depth.
`nearst120dp075`	Near side of fault, 12.0 km along strike, 7.5 km depth.

The prefixes `nearst` and `farst` refer to the two sides of a split node.

Each time series file contains 10 data fields, as follows. Refer to `Signconvention3d.pdf` for a diagram illustrating sign conventions.

Time Series Data Fields for TPV6 and TPV7	
Field Name	**Description, Units, and Sign Convention**
`t`	Time (s).
`h-disp`	Horizontal displacement (m). Sign convention: Positive means displacement **to the right** relative to the station's initial position.
`h-vel`	Horizontal velocity (m/s). Sign convention: Positive means motion **to the right**.
`h-stress`	Horizontal shear stress (MPa). Sign convention: Positive means shear stress that tends to cause **right-lateral** slip.
`v-disp`	Vertical displacement (m). Sign convention: Positive means displacement **downward** relative to the station's initial position.
`v-vel`	Vertical velocity (m/s). Sign convention: Positive means motion **downward**.
`v-stress`	Vertical shear stress (MPa). Sign convention: Positive means shear stress that tends to cause **downward** slip (that is, the far side of the fault slipping downward relative to the near side of the fault).
`n-disp`	Normal displacement (m). Sign convention: Positive means displacement **away from the viewer, into the paper** (that is, away from near side of the fault and toward the far side of the fault) relative to the station's initial position.
`n-vel`	Normal velocity (m/s). Sign convention: Positive means motion **away from the viewer, into the paper** (that is, away from near side of the fault and toward the far side of the fault).
`n-stress`	Normal stress (MPa). Sign convention: Positive means **extension**.

The time series file consists of three sections, as follows:

Time Series File Format for TPV6 and TPV7	
File Section	**Description**
File Header	A series of lines, each beginning with a # symbol, that give the following information: • Benchmark problem (TPV6 or TPV7) • Author • Date • Code • Code version (if desired) • Node spacing or element size • Time step • Number of time steps in file • Station location • Descriptions of data columns (10 lines) • Anything else you think is relevant

Field List	A **single line**, which lists the names of the 10 data fields, in column order, separated by spaces. It should be:
	
	 `t  h-disp  h-vel  h-stress  v-disp  v-vel`
	 `   v-stress  n-disp  n-vel  n-stress`
	
	 (all on one line). The server examines this line to check that your file contains the correct data fields.

Time History	A series of lines. Each line contains 10 numbers, which give the data values for a single time step. The lines must appear in order of increasing time. **C/C++ users:** For all data fields *except* the time, we recommend using 14.6E or 14.6e floating-point format. For the time field, we recommend using 20.12E or 20.12e format (but see the note on the next page). **Fortran users:** For all data fields *except* the time, we recommend using E15.7 floating-point format. For the time field, we recommend using E21.13 format (but see the note on the next page). The server accepts most common numeric formats. If the server cannot understand your file, you will see an error message when you attempt to upload the file

Note: We recommend higher precision for the time field so the server can tell that your time steps are all equal. (If the server thinks your time steps are not all equal, it will refuse to apply digital filters to your data.) If you use a "simple" time step value like 0.01 seconds or 0.005 seconds, then there is no need for higher precision, and you can write the time using the same precision as all the other data fields. When you upload a file, the server will warn you if it thinks your time steps are not all equal.

Note: Each pair of stations at a given location should have the same values for the following data fields: h-stress, v-stress, and n-stress.

Here is an example of a time-series file. This is an invented file, not real modeling data.

```
# Example time-series file.
#
# This is the file header:
# problem=TPV6
# author=A.Modeler
# date=2007/01/23
# code=MyCode
# code_version=3.7
# element_size=100 m
# time_step=0.05
# num_time_steps=2400
# location= near side of fault, -12 km along strike, 7.5km depth
# Column #1 = Time (s)
# Column #2 = horizontal displacement (m)
# Column #3 = horizontal velocity (m/s)
# Column #4 = horizontal shear stress (MPa)
# Column #5 = vertical displacement (m)
# Column #6 = vertical velocity (m/s)
# Column #7 = vertical shear stress (MPa)
# Column #8 = normal displacement (m)
# Column #9 = normal velocity (m/s)
# Column #10 = normal stress (MPa)
#
# The line below lists the names of the data fields:
t  h-disp  h-vel  h-stress  v-disp  v-vel  v-stress  n-disp  n-vel  n-stress
#
# Here is the time-series data.
# There should be 10 numbers on each line, but this page is not wide enough
#  to show 10 numbers on a line, so we only show the first five.
0.000000E+00   0.000000E+00   0.000000E+00   7.000000E+01   0.000000E+00   ...
5.000000E-02   0.000000E+00   0.000000E+00   7.104040E+01   0.000000E+00   ...
1.000000E-01   0.000000E+00   0.000000E+00   7.239080E+01   0.000000E+00   ...
1.500000E-01   0.000000E+00   0.000000E+00   7.349000E+01   0.000000E+00   ...
2.000000E-01   0.000000E+00   0.000000E+00   7.440870E+01   0.000000E+00   ...
2.500000E-01   0.000000E+00   0.000000E+00   7.598240E+01   0.000000E+00   ...
# ... and so on.
```

5

3 Contour Plot Data Files

The contour plot file lists the locations of all the nodes on the fault surface, and the time at which each node ruptures.

The contour plot file is an ASCII file.

Each file contains three data fields, as follows. See `Signconvention3d.pdf` for a diagram illustrating coordinates and sign conventions.

Note: The server has been upgraded, so you can now upload contour plot files directly to the server, instead of submitting them by email.

Contour Plot Data Fields for TPV6 and TPV7	
Field Name	**Description, Units, and Sign Convention**
`j`	Distance along strike (m). Sign convention: Positive means a location **to the right** of the hypocenter. For TPV6 and TPV7, the value of `j` can range from -15000 to 15000.
`k`	Distance down-dip (m). Sign convention: Zero is the earth's surface, and positive means **underground**. For TPV6 and TPV7, the value of `k` can range from 0 to 15000.
`t`	Rupture time (s). This is the time at which fault slip-rate first changes from zero to greater than 1 mm/s. If this node never ruptures, use the value 1.0E+09.

A pair of numbers `(j,k)` denotes a point on the fault surface.

The new contour plot file consists of three sections, as follows:

Contour Plot File Format for TPV6 and TPV7	
File Section	**Description**
File Header	A series of lines, each beginning with a # symbol, that give:: • Benchmark problem (TPV6 or TPV7) • Author • Date • Code • Code version (if desired) • Node spacing or element size • Descriptions of data columns (3 lines) • Anything else you think is relevant
Field List	A **single line**, which lists the names of the three data fields, in column order, separated by spaces. It should be: `j    k    t` (on one line).
Rupture History	A series of lines. Each line contains three numbers, which give the (j,k) coordinates of a node on the fault surface, and the time `t` at which that node ruptures. **C/C++ users:** We recommend using 14.6E or 14.6e floating-point format. **Fortran users:** We recommend using E15.7 floating-point format. If a node never ruptures, the time should be given as 1.0E+09. Nodes may be listed in any order.

Note: The nodes may appear in any order. The nodes do not have to form a rectangular grid, or any other regular pattern.

Note: When you upload a file, the server constructs the Delaunay triangulation of your nodes. Then, it uses the Delaunay triangulation to interpolate the rupture times over the entire fault surface. Finally, it uses the interpolated rupture times to draw a series of contour curves at intervals of 0.5 seconds.

Here is an example of a contour-plot file. This is an invented file, not real modeling data.

```
# Example new contour-plot file.
#
# This is the file header:
# problem=TPV6
# author=A.Modeler
# date=2007/01/23
# code=MyCode
# code_version=3.7
# element_size=100 m
# Column #1 = horizontal coordinate, distance along strike (m)
# Column #2 = vertical coordinate, distance down-dip (m)
# Column #3 = rupture time (s)
#
# The line below lists the names of the data fields.
# It indicates that the first column contains the horizontal
#  coordinate (j), the second column contains the vertical
#  coordinate (k), and the third column contains the time (t).
j  k  t
#
# Here is the rupture history
6.000000E+02    7.000000E+03    3.100000E-02
6.000000E+02    7.100000E+03    4.900000E-02
6.000000E+02    7.200000E+03    6.700000E-02
7.000000E+02    7.000000E+03    1.230000E-01
7.000000E+02    7.100000E+03    1.350000E-01
7.000000E+02    7.200000E+03    1.470000E-01
# ... and so on.
```

4 Using the Web Server to Upload Files

The web server lets you upload your modeling results. Once uploaded, you and other modelers can view the data in various ways.

4.1 Logging in and Selecting a Problem

To log in, start your web browser and go to the home page at:

```
http://scecdata.usc.edu/cvws/cgi-bin/cvws.cgi
```

Click on "Upload Files," and then log in using your user name and password. Remember that passwords are case-sensitive.

You are then presented with a list of code validation problems (currently, TPV6 and TPV7). Find the problem you want, and click the "Select" button.

You will then see a list of files for the problem.

4.2 Navigating the Site

You navigate through the site by clicking buttons on the web pages.

Avoid using your browser's Back or Forward buttons. If you use the Back or Forward buttons, you may get error messages from your browser.

4.3 Uploading a File

To upload a file, do the following:

Step 1. Find the file you want to upload, and click "Select."

The server displays a page for you to upload the file.

Step 2. Select the file on your computer that contains the modeling data. The exact method you use to select the file varies depending on which operating system and web browser you are using.

Step 3. Click on "Click Once to Upload." The file you selected is uploaded to the server.

When you upload a file, the web server immediately checks it to see that it is correctly formatted. There are three possible results:

- If the file is correctly formatted, the server displays a page saying that the upload succeeded.

- If the file contains errors, the server displays an error log. The error log lists the errors that were detected in the file, each identified as specifically as possible.

- If the file is correctly formatted, but is questionable in some way (for example, a missing time step), then the server displays a warning log, which describes the problem.

After uploading a file, the file list shows the date and time that you uploaded the file.

Remember that any file you upload will be visible to anyone who has access to the web site.

4.4 Graphing, Viewing, and Deleting Files

After uploading a file, additional functions become available. These functions let you graph, view, or delete the uploaded file.

4.4.1 Graphing a File

To graph a file, find the file you want and click "Graph."

For a time-series file, the server displays graphs of all the data fields in the file. For a contour-plot file, the server displays the contour plot.

At the bottom of each graph page, there is a box you can use to adjust graphing preferences.

For a time-series file, you can apply a low-pass filter to remove high-frequency noise and oscillations. To apply a low-pass filter, scroll to the bottom of the page, enter the desired cutoff frequency, and click "Apply Changes."

Graphing a file is a good way to check that the server is interpreting your data as you intended.

4.4.2 Viewing a File

To view the text of a file, find the file you want and click "View."

4.4.3 Deleting a File

To delete a file from the server, find the file you want and click "Delete." The server displays a page asking you to confirm the deletion.