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SOFTWARE RELEASE NOTICE

01. SRN Number: GLGP-SRN-138		
02. Project Title: Structural Deformation & Seismicity Code Development		Project No. 20-5708-472
03. SRN Title: 3DStress, Version 1.2		
04. Originator/Requestor: Brent Henderson		Date: 11/11/96
05. Summary of Actions <ul style="list-style-type: none"> <input type="checkbox"/> Release of new software <input checked="" type="checkbox"/> Release of modified software: <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Enhancements made <input type="checkbox"/> Corrections made <input type="checkbox"/> Change of access software <input checked="" type="checkbox"/> Software Retirement <i>A. Lawrence M⁵/Keyne 11/30/01</i> 		
06. Persons Authorized Access		
Name	RO/RW	A/C/D
David Ferrill	RW	
Brent Henderson	RW	
John Stamatakis	RW	
Larry McKague	RW	
Robert Boenau (student)	RW	
Don Chery (NRC)	RO	
Mike Conway	RO	
Chuck Connor	RO	
Britt Hill	RO	
Ron Martin	RO	
07. Element Manager Approval: <i>A. Lawrence M⁵/Keyne</i>		Date: 11/12/96
08. Remarks: <p style="margin-left: 40px;">Enhancements include significant improvements to the user interface, ability to load coverages in the 2D map viewer, and display of slip vectors for selected fault surfaces.</p>		

SOFTWARE SUMMARY FORM

01. Summary Date: 11/12/96	02. Summary prepared by (Name and phone) Bruce Mabrito, (210)522-5149	03. Summary Action: New Release	
04. Software Date: 11/11/96	05. Short Title: 3DStress Version 1.2		
06. Software Title: 3DStress, Version 1.2		07. Internal Software ID: NONE	
08. Software Type: <input type="checkbox"/> Automated Data System <input checked="" type="checkbox"/> Computer Program <input type="checkbox"/> Subroutine/Module	09. Processing Mode: <input type="checkbox"/> Interactive <input type="checkbox"/> Batch <input checked="" type="checkbox"/> Combination	10. APPLICATION AREA a. General: <input checked="" type="checkbox"/> Scientific/Engineering <input type="checkbox"/> Auxiliary Analyses <input type="checkbox"/> Total System PA <input type="checkbox"/> Subsystem PA <input type="checkbox"/> Other b. Specific:	
11. Submitting Organization and Address: CNWRA, SwRI, San Antonio, Texas		12. Technical Contact(s) and Phone: Dave Ferrill, 522-6082	
13. Narrative: 3DStress is an interactive tool for analyzing the tendency for faults and fractures to slip or dilate based on a user specified three dimensional stress state.			
14. Computer Platform Silicon Graphics (SGI)	15. Computer Operating System: IRIX 5.3	16. Programming Language(s): C++	17. Number of Source Program Statements: 44379 lines
18. Computer Memory Requirements: 16 MB minimum	19. Tape Drives: Supplied on 4mm or 8mm tape	20. Disk/Drum Units: 6 MB minimum	21. Graphics: Open GL
22. Other Operational Requirements NONE			
23. Software Availability: <input checked="" type="checkbox"/> Available <input type="checkbox"/> Limited <input type="checkbox"/> In-House ONLY		24. Documentation Availability: <input checked="" type="checkbox"/> Available <input type="checkbox"/> Inadequate <input type="checkbox"/> In-House ONLY	
Software Custodian: <u>Bruce Mabrito</u> Date: <u>11/12/96</u>			

CENTER FOR NUCLEAR WASTE REGULATORY ANALYSES

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DESIGN VERIFICATION REPORT FOR CNWRA SOFTWARE: 3DStress Version 1.2

May 8, 1997

3DStress Version 1.2

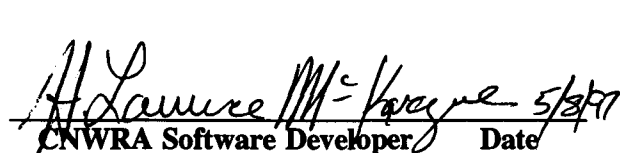
1. Scientific Notebook Documentation Development: CNWRA Scientific Notebook number 113 was verified and was Brent Henderson's Scientific Notebook; it's archived in the CNWRA QA Records Room as a QA Record.
2. Programming Language: ANSI C++, using a CC Compiler; IRIX 5.3 Operating System on the "Yosemite" Server.
3. Internal Documentation: On 4/17/97, B. Mabrito reviewed portions of the 3DStress Version 1.2 scientific and engineering software on one of the CNWRA platforms in the GIS Room of Building 189. Comment documentation was checked and there is ample, clear, and numerous internal documentation comments meeting the requirements of TOP-018, Section 5.4.4. Considerable structure to the software was added due to the Revision Control System (RCS) which was utilized and each change was captured by the RCS. Mr. Robert Boenau of the GLGP Element exercised the 3DStress Version 1.2 software during this verification.
4. Software Labels and Data
 - a. Header Data and Format: 3DStress Version 1.2 header data and the format were compared against TOP-018 Section 5.4.6 and found generally acceptable. See attached printout sheets from 3DStress Version 1.2. It was brought to the attention of R. Boenau that a more comprehensive disclaimer/notice is desired for later versions of this scientific and engineering software.
 - b. NRC Data: 3DStress Version 1.2 header data and the format were compared against TOP-018, Section 5.4.6, third bullet and found generally acceptable.
 - c. Source Code Header: The 3DStress Version 1.2 source code header data was compared to TOP-018 Section 5.4.6, fourth bullet, and found acceptable.
5. Unique Run Identification: At the top of each output file a unique identifier was created on the page printout. For instance, a page of the file printed May 8, 1997, as a request of the CNWRA Software Custodian, and attached to this report showed the following: "May 8 1997 16:17" in the grey bar across the top of the page. Additionally, in the text box it further stated "#Created by: @(#)3dstress 10-30-96 Rev 1.2 #Date: Thu May 8 16:16:55 1997" which fully meets the unique run identification requirements of TOP-018. See attachments for objective evidence.

6. Software Analysis and Results

a. Analysis: During development, "OpenGL Debugger" (a software analysis and debugging tool) was utilized by B. Henderson (3DStress Version 1.2 developer) as the software analysis tool. "ogldebug," as it is known, has two parts, a user interface control application and a special library that "sits" between an application and libGL.so (libogldebug.so). They work together to control the flow of GL calls and to gather state information.

b. Analysis Report: Portions of the OpenGL Debugger description have been printed and attached to this Design Verification Report. B. Henderson utilized OpenGL Debugger to obtain both warning and error messages that were primarily as screen displays. These messages were acted upon immediately and no printouts were made or electronic copies maintained. B. Mabrito spoke long-distance with B. Henderson on 5/8/97 about this matter and conveyed the information below regarding the resolution of comments.

c. Resolution of Comments: The 3DStress Version 1.2 developer reviewed all the warning and error messages and addressed them in the course of developing the scientific and engineering software. According to the developer, this was the best way to develop the code and he believes he addressed all warning and error messages that the software analysis tool OpenGL Debugger identified.


CNWRA Software Developer Date 5/8/97


CNWRA Software Custodian Date 5/8/97

Attachments/

original to: Software Folder
cc: CNWRA Software Developer



"Open GL Debugger"

Software Analysis Tool utilized in
development of 3D Stress 1.2
Printed by rboenau from yosemite

Apr 17 1997 18:51 ogldebug Page 1		
ogldebug(3G)	OpenGL Reference	ogldebug(3G)
NAME		
ogldebug - GL debugging utility		
DESCRIPTION		
ogldebug is a development tool that allows the user to examine GL calls generated by an application.		
ogldebug has two parts: a user interface control application ogldebug and a special library that sits between an application and libGL.so (libogldebug.so). They work together to control the flow of GL calls and to gather state information.		
libogldebug.so must be in the same directory as libGL.so (normally /usr/lib). ogldebug should be in a directory that is included in your \$PATH environment variable (normally /usr/sbin).		
To debug an GL application, enter the command:		
ogldebug <application> <application parameters if any>		
ogldebug becomes active when the application makes it's first GL call. The main window will appear and the application is paused so you can set up ogldebug. The main window is described below:		
At the top of the main window, you will find a row of control buttons.		
Restart restart the application.		
Continue continue execution of application.		
Halt stop at the next GL call.		
Step single step to the next GL call.		
Skip skip the current GL call and step to the next one.		
For both Step and Skip, if the application is running, ogldebug will halt at the next GL call.		
Below the row of control buttons is a status display field. This provides you with confirmation if you issue one of the above commands. It also prints responses to your command. Other messages may also appear.		
Below the status display field is a call information display field. This shows the current GL call to be executed.		
Below the call information display field is a series of toggle buttons for user options.		
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ogldebug

Page 2

Break (GL error)	call GetError after every GL call to check for errors.
Break (selected)	break at those GL calls selected in the Break Select menu.
Skip (selected)	skip at those GL calls selected in the Skip Select menu.
Trace (selected)	trace those GL calls selected in the Trace Select menu to a file.
GLF Metafile	trace all GL calls in SGI's GLF trace format to a file.
Pause call information	pause call information.
Stop history accumulation	stop saving history.

The default trace file name is <application name>.trace. The trace file name can be changed in the **Set Trace File Name** menu. The trace file format is C-like and can be compiled. The default GLF metafile file name is <application name>.glf. The GLF metafile file name can be changed in the **Set GLF File Name** menu. The GLF Metafile option is only available if libGL.so is present in the same directory as libGL.so. **Pause call information** and **Stop history accumulation** make the application run faster.

The menu items are described below:

Under the **File** menu, you will find:

Open	open application for debugging or change command line options to current debugging session.
Set Trace File Name	set the directory and file name of the trace file.
Set GLF File Name	set the directory and file name of the GLF metafile.
Quit	exit ogldebug.

Under the **Command** menu, you will find duplicate functionality of the control buttons. This provides you with fast keyboard equivalence.

Under the **Option** menu, you will find:

Break Select	bring up a window to set/unset GL call breakpoints.
---------------------	---

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ogldebug(3G)

OpenGL Reference

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Call Count	bring up a window with information about the total number of GL calls as well as individual counts for each GL call.
-------------------	--

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ogldebug

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Display List Information

bring up a window with information about the application's display lists.

History

bring up a window with a history of the last 1000 GL calls.

Skip Select

bring up a window to set/unset which GL calls to skip.

State Information

bring up a window with application state information.

Trace Select

bring up a window to set/unset traceable GL calls.

Window Information

bring up a window with application window information.

All the Select items (Break, Skip, Trace) provide two ways of saving your selection grouping. The first way saves to memory. You can save/recall up to three different set/unset groupings at a time. The second level saves to a file. Each file will contain your 3 selection groupings. You can view the contents of each display list by selecting that display list in the Display List Information window. The State Information window provides 5 different ways of displaying state information.

Non-default

displays those states not in default.

Delta-changed

displays those states that changed since the last GL call.

Selected option

displayed those states selected in the State Information Select menu.

Selected and Non-default

display those states selected in the

State Information Select

menu which are not set to their default values.

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ogldebug(3G)

OpenGL Reference

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Selected and Delta-changed

display those states selected in the State Information Select menu which have changed since the last GL call.

The State Information Select window provides special groupings consistent with those used by `glPushAttrib` and `glPopAttrib`

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ogldebug

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The State Information Select window also provides the same two levels of selection saving as described for Break, Skip and Trace Select.

Under the Reference menu, you will find:

Default State

a reference to the GL default states.

Enumerates

a reference to the GL enumerant values.

ERRORS

The error checking (the `GetError` call) cannot be executed after the execution of `Begin` and the `End` pairs (see `GetError`).

NOTES

`ogldebug` allocates a buffer to hold call information. For applications that use textures or bitmaps, these calls can require a huge buffer to hold all the call information. By default, `ogldebug` allocates a 64KB buffer. If this buffer is too small (or too large), you can cause `ogldebug` to allocate a different size buffer on startup by setting an environmental variable `OGLDEBUG_BUFFER_SIZE` to equal your desired size. (i.e. `setenv OGLDEBUG_BUFFER_SIZE 32768` will cause `ogldebug` to allocate a 32KB buffer).

If you want the standard "look and feel" of SGI's GUI, put the following lines in your `.Xdefaults` file:

```
ogldebug*sgiMode: true
ogldebug*useSchemes: all
```

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Software analysis Tool utilized in development
of 3D stress

Printed by rboenau from yosemite

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DBX(1)	Silicon Graphics	DBX(1)
NAME	dbx, odbx - a source-level debugger	
SYNOPSIS	dbx dbx-options [object-file] [core-file] dbx dbx-options [-r] [object-file] [arguments . . .] dbx-options: [-I directory] [-c file] [-i] [-k] [-p pid] [-P name] [-x]	
DESCRIPTION	<p>dbx is a source-level debugger that allows the user to trace the execution of a given <u>object-file</u> as well as a pool of arbitrary processes. <u>odbx</u> is an older debugger version (provided in case something in <u>dbx</u> fails to work properly). <u>dbx</u> works with <u>cc(1)</u>, <u>f77(1)</u>, <u>pc(1)</u>, <u>as(1)</u>, <u>CC(1)</u>, and MIPS machine code on COFF 2object-files and on 32- and 64-bit ELF 2object-files.</p> <p>The <u>object-file</u> used with the debugger is produced by specifying an appropriate option (usually <u>-g</u>) to the compiler (and linking the resulting <u>object(s)</u>, creating an executable 2object-file). The resulting <u>object-file</u> contains debugging information, including the names of all source files that the compiler translated to create the <u>object-file</u>. These source files are accessible from the debugger.</p> <p>If a <u>core-file</u> is specified, or if the file <u>core</u> exists in the current directory, <u>dbx</u> can be used to look at the state of the program when it faulted.</p> <p>The file <u>/usr/lib/dbx.help</u> is a text file explaining features of <u>dbx</u>. Read it for additional information on assembler-level debugging, expressions in <u>dbx</u>, and examples.</p> <p>This man page shows only some of the <u>dbx</u> commands: See the help file and the appropriate reference manual for details and for information on additional features.</p> <p>Running dbx If a <u>.dbxinit</u> file resides in the current directory or in the user's home directory, the commands in it are executed when <u>dbx</u> is invoked.</p> <p>The environment variable <u>DBXINIT</u> may be used to hold <u>dbx</u> command line options. If present, the contents of <u>DBXINIT</u> are inserted before the command line options.</p> <p>When invoked, <u>dbx</u> recognizes these command line options:</p> <p>-I directory Tells <u>dbx</u> to look in the specified directory for source files. Multiple directories can be specified by using multiple <u>-I</u> options. <u>dbx</u> searches for source files in the current directory</p>	
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DBX(1)	Silicon Graphics	DBX(1)

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	and in the <u>object-file</u> 's directory whether or not <u>-I</u> is used.	
	-c file Selects a command file other than <u>.dbxinit</u> .	
	-i Uses interactive mode. This option does not treat <u>#s</u> as comments in a file. It prompts for source even when it reads from a file. With this option, <u>dbx</u> also has extra formatting as if for a terminal.	
	-p pid Debug the running process with the specified process id.	
	-P name Debug the running process with the specified name (<u>name</u> as shown in <u>ps(1)</u>).	
	-R (needed for <u>odbx</u> only) Turn on <u>\$debugrld</u> at startup, so one can set breakpoints in a dynamic-shared-object (dso) initialization function. (See the <u>ld(1)</u> <u>-init</u> option.) (In <u>dbx</u> , <u>-R</u> is not supported and not needed (breakpoints in initialization functions can be set without <u>-R</u>).)	
	-r Runs the <u>object-file</u> immediately. Arguments may be placed on the <u>dbx</u> command line. The <u>.dbxinit</u> file (if any) is read in and the commands in it executed after the <u>object-file</u> is run.	
	-e nnnn Choose a larger size for the evaluation space. Printing a very large structure one can exhaust the default 20,000 bytes of evaluation space. With this option you can make the space as large as desired. For example, to make the stack 100,000 bytes: -e 100000	
	-k Debug the operating system. When debugging a running system, <u>/dev/kmem</u> should be specified as the <u>core-file</u> .	
	-C (available for <u>odbx</u> only) Suppress the automatic truncation of <u>c++</u> variable names. Supplying this option causes the full long names output by <u>cfront</u> to <u>cc</u> to be visible. Normally only done when one believes <u>dbx</u> has truncated a name improperly. With this option <u>c++</u> code tends to be much more difficult to work with.	
	There are other, intentionally-undocumented, options (primarily for debugging the debugger).	
	The Monitor The following commands control the <u>dbx</u> monitor. Multiple commands can be specified on the same command line by separating them with a semicolon (;).	
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DBX(1)	Silicon Graphics	DBX(1)
	![string] [integer] [-integer] Specifies a command from the history list.	

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dbx

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help Prints a short list of **dbx** help topics and suggests some uses of the help command.

history Prints the items from the history list. The history list is \$lines lines long (20 by default).

hed int Brings the history list line into an editor in a temporary file. Whatever commands are still in the editor temporary file when you quit the editor are executed as ordinary **dbx** commands.

quit Exits **dbx**.

Controlling dbx

alias Lists all existing aliases.

alias name
Lists the alias string for **name**. The alias value is inserted in quotes with escape characters added to show how the alias "string" was typed. See the help file (**/usr/lib/dbx.help**) **EXPRESSIONS** section for additional information on strings and character escapes.

alias name name2
Defines a new alias.

unalias alias_name
Removes the alias **alias_name** from the alias table.

delete expression1, ...expressionN
Deletes the specified item(s) from the status list.

givenfile
Reports the name of the current **givenfile** (usually called an **object-file** on this page).

givenfile object-file
The argument **object-file** is taken as the name of the file to debug, just as if **object-file** had been given on the **dbx** command line. Existing processes are killed and **dbx** looks up the symbol table and **core-file** for this **object-file**.

corefile
Reports the current **core-file** name and whether data referencing commands actually reference the **core-file** or not. They will not reference the **core-file** if it is missing or damaged or if the process is running.

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DBX(1)

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corefile core-file
The argument **core-file** is taken as the name of a **core-file** to debug, just as if **core-file** had been given on the **dbx** command line. References to the process will use this **core-file**.

playback input [file]
Reads the commands in the file and executes them.

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dbx

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sh Calls a shell from **dbx**. If the environment variable **SHELL** is set, its value is taken as the name of the shell to use. If **SHELL** is not set, **csh(1)** is used.

sh shell_command
Executes a shell command.

status Lists currently set **stop**, **trace**, and **when** commands.

set Lists existing debugger variables and their values.

set variable = expression
Assigns a new value to an existing variable or a new variable. If the expression result is not of type "int" the **set** command will leave the result symbolic. To get the expression fully evaluated, cast the result to "int" as in **set variable = (int)expression**.

unset variable
Removes the specified debugger variable and its value from the debugger variable table.

Examining Source

/regular expression
Searches ahead in the source code for the regular expression.

?regular expression
Searches back in the source code for the regular expression.

directory
Lists source directories. Abbreviate as **dir**.

directory directory1 ... directoryN
Adds the new directory(s) to the previous list. Can be abbreviated **dir**. See also **use**.

edit Calls an editor on the current file from **dbx**.

edit file
Calls an editor from **dbx**.

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DBX(1)

Silicon Graphics

DBX(1)

edit func
Calls an editor on the file in which function **func** is defined.

file Prints the current file name.

file file
Changes the current file to the specified file.

list expression
Lists \$listwindow lines starting at line **expression**.

list expression, expression2

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viewNet.c++

Page 1

```
//
//-----
// Program Name: 3DStress ✓
// Program Version: 1.2 ✓
// Release Date: 10-22-96
// SPCR Number: GLGP-SPCR-101 ✓
//-----
//
// Developed by the Center for Nuclear Waste Regulatory ✓
// Analyses (CNWRA), Southwest Research Institute (SwRI), ✓
// San Antonio, Texas, USA.
// CNWRA Contact: David Ferrill (210) 522-6082 ✓
//
// Copyright 07/20/95 Southwest Research Institute
// All rights reserved.
//
// This software is a trade secret owned by Southwest Research
// Institute, with access limited except as required for use by
// authorized users.
//
// This program was developed under sponsorship of the U.S. ✓
// Nuclear Regulatory Commission, contract number NRC-02-93-005. ✓
// NRC Office of Nuclear Material Safety and Safeguards
// NRC Division of Waste Management, Engineering and Geoscience Branch ✓
// NRC Contact: Michael Bell (301) 415-7286 ✓
// Associated documentation: N/A
// NUREG-Series Designator: N/A
//
// Purpose:
// Stereo Net Viewing tool.
//
// ✓
// $Header: /pscr4/rob/src/RCS/viewNet.c++,v 1.37 1996/10/30 22:47:14 rboenau Exp
// $
//
// Revision History
// $Log: viewNet.c++,v $
// Revision 1.37 1996/10/30 22:47:14 rboenau
// Changed date
//
// Revision 1.36 1996/10/24 21:09:24 rboenau
// Header file changed and OPENINGTEXT
//
// Revision 1.35 1996/10/23 12:21:06 rboenau
// Controller now has picture when iconified
//
// Revision 1.34 1996/10/09 14:27:42 rboenau
// d command line option added along with code to support it
//
// Revision 1.33 1996/10/03 15:10:14 rboenau
// Use of stat to determine if helpfile present has been changed, since performer
// was unable to detect the file not being there
//
// Revision 1.32 1996/10/02 22:59:59 rboenau
// Fixed problem with getenv segment
//
// Revision 1.31 1996/10/02 20:09:17 rboenau
// Frees envGet differently
//
// Revision 1.30 1996/09/26 14:46:07 rboenau
// now can use -s with getopt, in any location
//
// Revision 1.29 1996/09/26 13:34:58 rboenau
// Uncommented command line options
//
// Revision 1.28 1996/09/25 16:14:36 rboenau
// Changed ident string
//
// Revision 1.27 1996/09/20 16:38:36 rboenau
// Now able to use environmental variable for location of helpfile
```

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viewNet.c++

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```
//
// Revision 1.26 1996/08/26 21:51:14 rboenau
// Got rid of the f4 option, ie normal font
//
// Revision 1.25 1996/08/09 17:15:10 rboenau
// Changed starting font and now display message dialog if cant find help file
//
// Revision 1.24 1996/08/07 21:27:04 rboenau
// Can no longer maximize controller
//
// Revision 1.23 1996/08/06 19:17:51 rboenau
// Command line options now done with getopt and now has variable font style
//
// Revision 1.22 1996/07/31 22:20:57 rboenau
// Now has comand line option for oclor of widgets
//
// Revision 1.21 1996/07/30 22:47:22 rboenau
// Added initialization to last so wont core dump
//
// Revision 1.20 1996/07/29 20:54:40 rboenau
// Commented out segment of code dealing with strncpy and the 3dstress helpfile t
// hat would cause the program to core dump on other systems
//
// Revision 1.19 1996/07/24 17:24:37 rboenau
// Added modality to infopopup
//
// Revision 1.18 1996/07/12 19:49:33 rboenau
// Got rid of manager widget..mainWin... to prevent the buttons from being resize
// d, all use topLevel instead
//
// Revision 1.17 1996/07/11 17:54:47 rboenau
// GUI was changed
//
// Revision 1.16 1996/07/05 19:44:26 rboenau
// Allow usage of fonts
//
// Revision 1.15 1996/02/09 18:17:54 brent
// Added -stress -fault command line options.
//
// Revision 1.14 1996/02/06 18:00:53 brent
// Separated command and tendency plot windows.
//
// Revision 1.13 1996/02/05 20:43:07 brent
// Modified version number.
//
// Revision 1.12 1996/01/23 21:23:20 brent
// Modified ident string.
//
// Revision 1.11 1996/01/17 00:51:38 brent
// Commented out print statement.
//
// Revision 1.10 1996/01/17 00:51:00 brent
// Read path from argv to set path to help file.
//
// Revision 1.9 1996/01/08 16:58:36 brent
// Modified ident string.
//
// Revision 1.8 1996/01/02 20:51:55 brent
// Added getSlipV functions.
//
// Revision 1.7 1995/07/20 21:02:10 cfleming
// Added copyright notice.
//
// Revision 1.6 1995/07/13 16:05:36 brent
// Modified ident string.
//
// Revision 1.5 1995/06/28 13:30:26 brent
// Added ident char string for use with what(1) command.
//
// Revision 1.4 1995/06/27 18:18:07 brent
// Added opening info dialog.
```

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viewNet.c++

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```
//
// Revision 1.3 1995/05/31 15:35:04 brent
// Removed calls to msgClass.
//
// Revision 1.2 1995/02/22 20:05:58 brent
// Enabled keyboard events for graphics area.
//
// Revision 1.1 1994/10/25 14:28:07 brent
// Initial revision
//
//
//
//
// Unix includes
#include <iostream.h>
#include <stdio.h>
#include <string.h>
#include <math.h>
#include <stdlib.h>
#include <sys/types.h>
#include <sys/stat.h>
#include <malloc.h>

// Motif includes
#include <Xm/Xm.h>
#include <Xm/MainW.h>
#include <Xm/MessageB.h>
#include <Xm/PushB.h>

// Application includes
#include "viewNetGlobals.hh"
#include "infoWidget.hh"
#include "xpm.h"
#include "3ds.xpm"

XtAppContext      appContext;

char ident[] = "@{#}3dstress 10-30-96 Rev 1.2";
//char ident[] = "@{#}3dstress 02-05-96 Rev 1.1a";

String anFallbacks[3][2] = {
    {"viewNet*fontList: *-helvetica*-r-normal*-10-*TAG1", NULL },
    {"viewNet*fontList: *-helvetica*-r-normal*-14-*TAG1", NULL },
    {"viewNet*fontList: *-helvetica*-r-normal*-18-*TAG1", NULL }
};

void introPopup(Widget);
void introClose(Widget,XtPointer,XtPointer);
void mainCalcTnd(char *[], int spot);
void mainCalcDil(char *[], int spot);
void mainRecord(char *filename);
void mainUsage(char *[]);

//
// Main
//
void main (int argc, char *argv[]) {
    // Widget      mainWin;
    Arg           args[20];
    int           n = 0;

    // Begin main

    int last = 0;
    char *envGet;
    struct stat statInfo;

    envGet = (char *)XtMalloc(sizeof(char) * 1024);
    envGet = getenv("3DSTRESS_HOME");
    if (envGet != NULL) {
```

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```
    sprintf(helpfile,"%s/.3dstress_help", envGet);
    if (stat(helpfile, &statInfo) != -1) {
        foundHelpFile = 1;
    }
} // end if
// Xtfree(envGet);

if (foundHelpFile != 1) {
    for (int i = 0; i < strlen(argv[0]); i++) {
        char ch = *(argv[0]+i);
        if (ch == '/') {
            last = i;
        }
    }

    if (last == 0) {
        (void)strcpy(helpfile, "./.3dstress_help\0");
    } else {
        (void)strncpy(helpfile, argv[0], last);
        (void)strcat(helpfile, "/.3dstress_help");
    }
    // cout << "File = " << helpfile << endl << flush;

    if (stat(helpfile, &statInfo) != -1) {
        foundHelpFile = 1;
    }
} // end if

// Different method of checking for command line switches
int c;
int errflag = 0;
while ((c = getopt(argc, argv, "b:c:d:f:hr:s:")) != EOF) {
    switch (c) {
        case 'b':
            BUTTON_COLOR = atoi(optarg);
            continue;
        case 'c':
            WIDGET_COLOR = atoi(optarg);
            continue;
        case 'd':
            if (argc < (optind + 7))
                mainUsage(argv);
            else
                mainCalcDil(argv, optind-1);
            exit(0);
        case 'h':
            mainUsage(argv);
            exit(0);
        case 'f':
            if (atoi(optarg) < 1 || atoi(optarg) > 3) {
                errflag++;
                continue;
            }
            else {
                fontSize = atoi(optarg);
                continue;
            }
        case 'r':
            mainRecord(optarg);
            exit(0);
        case 's':
            if (argc < (optind + 7))
                mainUsage(argv);
            else
                mainCalcTnd(argv, optind-1);
            exit(0);
        case '?':
            errflag++;
    } // endof switch
} // endof while
```


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```

if (errflag) {
    mainUsage(argv);
    exit(0);
}
XtSetArg(args[n], XmNnoResize, TRUE); n++;
XtSetArg(args[n], XmNheight, 50); n++;
XtSetArg(args[n], XmNmaxHeight, 50); n++;
XtSetArg(args[n], XmNwidth, 800); n++;
XtSetArg(args[n], XmNmaxWidth, 800); n++;
XtSetArg(args[n], XmNbackground, WIDGET_COLOR); n++;

topLevel = XtAppInitialize(&appContext, // context return
                          "viewNet",    // class
                          NULL,         // options
                          0,            // num options
                          &argc,       // argc in out
                          argv,        // argv in out
                          anFallbacks[fontSize-1], // fallback
                          args,       // args in
                          n,          // num args in
                          );

Pixmap iconpixmap;
XpmCreatePixmapFromData(XtDisplay(topLevel),
                        XRootWindowOfScreen(XtScreen(topLevel)),
                        controller_xpm, &iconpixmap, NULL, NULL);
XtVaSetValues(topLevel, XmNiconPixmap, iconpixmap, NULL);

/*
// Create MainWindow Widget
mainWin = XtVaCreateManagedWidget(
    "mainWin", // widget name
    xmMainWindowWidgetClass, // widget class
    topLevel, // parent widget
    // XmNscrollBarDisplayPolicy, XmAS_NEEDED, // varargs list
    // XmNscrollingPolicy, XmAUTOMATIC,
    // XmNtraversalOn, TRUE,
    // XmNnoResize, TRUE,
    // XmNheight, 50,
    // XmNwidth, 800,
    // XmNbackground, 15,
    NULL
);

cntlObj.initialize(topLevel);

// menuObj.initialize(mainWin); // File & help
cmdObj.initialize(topLevel); // sliders

//-----
// Default main window:
//-----
//      menubar
//      cmdWin
//      workRegion
//-----

/*
XtVaSetValues (
    mainWin,
    // XmNmenuBar, // menu bar
    // menuObj.getWidget(),
    // command window
    // cmdObj.getWidget(),
    // work region (scrolled)

```

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```

// XmNworkWindow, gfxObj.getWidget(),
// message window
XmNshowSeparator, TRUE,
XmNnoResize, TRUE,
NULL
);

/*

// Realize widgets and execute main loop
XtRealizeWidget(topLevel);

gfxObj.initialize(topLevel);
plotObj.display();

if (!foundHelpFile) {
    infoWidget(topLevel, "Could not find help file");
}

introPopup(topLevel);
XtAppMainLoop(appContext);

} // End main

#define OPENINGTEXT "3DStress version 1.2\n\
\n\
Developed by CMWRA, Southwest Research Institute (SwRI),\n\
San Antonio, Texas, USA.\n\
\n\
Copyright 10/30/96 Southwest Research Institute, all rights reserved\n\
This software is a trade secret owned by Southwest Research\n\
Institute, with access limited except as required for use by\n\
authorized users.\n\
\n\
This program was developed under sponsorship of the U.S.\n\
Nuclear Regulatory Commission, contract number NRC-02-93-005."

void introPopup( Widget parentw ) {
    Widget dialog;
    XmString xm_string;
    Arg args[7];
    int n = 0;
    // Begin
    xm_string = XmStringCreateLtoR(OPENINGTEXT, XmFONTLIST_DEFAULT_TAG);
    XtSetArg (args[n], XmNmessageString, xm_string); n++;
    XtSetArg (args[n], XmNbackground, WIDGET_COLOR); n++;
    switch (fontSize){
        case 0:
            XtSetArg(args[n], XmNheight, 70); n++;
            XtSetArg(args[n], XmNwidth, 750); n++;
            break;
        case 1:
            XtSetArg(args[n], XmNheight, 50); n++;
            XtSetArg(args[n], XmNwidth, 380); n++;
            break;
        case 2:
            XtSetArg(args[n], XmNheight, 50); n++;
            XtSetArg(args[n], XmNwidth, 500); n++;
            break;
        case 3:
            XtSetArg(args[n], XmNheight, 50); n++;
            XtSetArg(args[n], XmNwidth, 650); n++;
            break;
    }
    XtSetArg(args[n], XmNdialogStyle, XmDIALOG_PRIMARY_APPLICATION_MODAL); n++;
    dialog = XmCreateMessageDialog (parentw, "info", args, n);
    XtUnmanageChild (XmMessageBoxGetChild (dialog, XmDIALOG_CANCEL_BUTTON));

```

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```

plotObj.findSlipV(faz, fdp);
double tend = plotObj.getDilationTend();
cout << "sxyz = "
    << sx << " "
    << sy << " "
    << sz << " rxyz = "
    << rx << " "
    << ry << " "
    << rz << " flt = "
    << fst << " "
    << fdp
    << " diltend = "
    << tend << endl << flush;
} // end mainCalcDil

void mainUsage(char *av[]) {
    cout << endl << endl << ident << endl
        << endl << "Usage: " << av[0]
        << " [-f font size] [-b button color] [-c window color] [-h help]"
        << endl
        << " -r filename [WARNING: takes 1 hour to create a 70MB file.]"
        << endl
        << " -d sx sy sz rx ry rz fstrike fdip [Dilation tendency]"
        << endl
        << " -s sx sy sz rx ry rz fstrike fdip [Slip tendency]"
        << endl << endl << flush;
} // end mainUsage

```

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```

//-----
// Read file Pass 2: store XY data
//-----
rewind(fp);
int n = 0;
int lastStrike;
float segmentLength;
// Read line ID
fgets(fstr,256,fp);
do {
    // Next XY pair
    fgets(fstr,256,fp);
    startLine = 1;
    while(strncasecmp(fstr, "END", 3) != 0) {
        for (int tindex = 0; tindex < strlen(fstr); tindex++)
            if (fstr[tindex] == 'D')
                fstr[tindex] = 'E';
        sscanf(fstr,"%lf%lf",&a,&b);
        (data+n)->c[0] = 1.0;
        (data+n)->c[1] = 1.0;
        (data+n)->c[2] = 1.0;
        (data+n)->x = a;
        (data+n)->y = b;
        (data+n)->newLine = startLine;

        if (startLine) {
            // At start of a new line.
            startLine = 0;
            if (n > 0) {
                if (segmentLength > lnContLengthStep10[lastStrike]) {
                    lnContLengthStep10[lastStrike] = segmentLength;
                }
                lastStrike = -1;
                segmentLength = 0.0;
                (data+n)->strike = 0.0;
                (data+n)->length = 0.0;
            } else {
                int p = n-1;
                float x0 = (data+p)->x;
                float y0 = (data+p)->y;
                float x1 = (data+n)->x;
                float y1 = (data+n)->y;
                float dx = x1 - x0;
                float dy = y1 - y0;
                (data+n)->length = fsqrt(dx*dx + dy*dy);

                // Strike ranges from 0.0 to 180.0 deg
                float strk = lnRTD * atan2(dx,dy);
                if (strk < 0.0) strk += 180.0;
                if (strk == 180.0) strk = 0.0;
                (data+n)->strike = strk;

                // int s1 = (int)rint(strk);
                // int s5 = s1/5;
                // int s10 = s1/10;
                int s10 = (int)floor(strk/10.0);
                if (s10 >= 18) s10 -= 18;

                // lnCumLengthStep1[s1] += (data+n)->length;
                // lnCumLengthStep5[s5] += (data+n)->length;
                lnCumLengthStep10[s10] += (data+n)->length;

                if (lastStrike == -1) lastStrike = s10;

                if (s10 != lastStrike) {
                    // New strike direction
                    if (segmentLength > lnContLengthStep10[lastStrike]) {
                        lnContLengthStep10[lastStrike] = segmentLength;
                    }
                    segmentLength = 0.0;
                }
            }
        }
    }
} while(strncasecmp(fstr, "END", 3) != 0);

```

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```

        lastStrike = s10;
    }
    segmentLength += (data+n)->length;

    // cout << "x0 = " << x0
    // << "x1 = " << x1
    // << "dx = " << dx << endl
    // << "y0 = " << y0
    // << "y1 = " << y1
    // << "dy = " << dy << endl
    // << "len = " << (data+n)->length
    // << "str = " << (data+n)->strike
    // << endl << flush;
}
n++;
// Read next line: either next XY pair or END
fgets(fstr,256,fp);
} // end while not END
// Line ID
fgets(fstr,256,fp);
} while(strncasecmp(fstr, "END", 3) != 0);

```

*Unique Raw
identification*

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page2

Page 1

#Created by: @(#)3dstress 10-30-96 Rev 1.2

#Date: Thu May 8 16:16:55 1997

#Generated by: Tendency Plot

#	Mag	Dir	Plng
#SX	100	0	90
#SY	50	0	0
#SZ	5	90	0

#Strike	Dip	Slip Tendency
0.0	0.0	0.000000
0.0	10.0	0.167251
0.0	20.0	0.343497
0.0	30.0	0.539491
0.0	40.0	0.770036
0.0	50.0	1.057097
0.0	60.0	1.430825
0.0	70.0	1.894906
0.0	80.0	2.065706
0.0	90.0	0.000000
10.0	0.0	0.000000
10.0	10.0	0.165365
10.0	20.0	0.339277
10.0	30.0	0.531808
10.0	40.0	0.756411
10.0	50.0	1.031911
10.0	60.0	1.380446
10.0	70.0	1.788039
10.0	80.0	1.929792
10.0	90.0	1.210564
20.0	0.0	0.000000
20.0	10.0	0.159824
20.0	20.0	0.326936
20.0	30.0	0.509553
20.0	40.0	0.717600
20.0	50.0	0.962261
20.0	60.0	1.248566
20.0	70.0	1.535674
20.0	80.0	1.614275
20.0	90.0	1.409073
30.0	0.0	0.000000
30.0	10.0	0.150976
30.0	20.0	0.307412
30.0	30.0	0.474950
30.0	40.0	0.659040
30.0	50.0	0.862422
30.0	60.0	1.075597
30.0	70.0	1.249835
30.0	80.0	1.275339
30.0	90.0	1.199112
40.0	0.0	0.000000
40.0	10.0	0.139424
40.0	20.0	0.282221
40.0	30.0	0.431295
40.0	40.0	0.587880
40.0	50.0	0.748243
40.0	60.0	0.895838
40.0	70.0	0.989708
40.0	80.0	0.982143
40.0	90.0	0.939188
50.0	0.0	0.000000
50.0	10.0	0.126058
50.0	20.0	0.253453
50.0	30.0	0.382619
50.0	40.0	0.511530
50.0	50.0	0.632670
50.0	60.0	0.728269
50.0	70.0	0.769042
50.0	80.0	0.740080
50.0	90.0	0.705515

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60.0	0.0	0.000000			
60.0	10.0	0.112145			
60.0	20.0	0.223869			
60.0	30.0	0.333637			
60.0	40.0	0.437218			
60.0	50.0	0.525336			
60.0	60.0	0.581464			
60.0	70.0	0.585533			
60.0	80.0	0.538516			
60.0	90.0	0.502853			
70.0	0.0	0.000000			
70.0	10.0	0.099444			
70.0	20.0	0.197117			
70.0	30.0	0.290063			
70.0	40.0	0.372655			
70.0	50.0	0.434827			
70.0	60.0	0.461294			
70.0	70.0	0.436802			
70.0	80.0	0.368370			
70.0	90.0	0.323290			
80.0	0.0	0.000000			
80.0	10.0	0.090234			
80.0	20.0	0.177826			
80.0	30.0	0.258931			
80.0	40.0	0.327081			
80.0	50.0	0.371678			
80.0	60.0	0.377594			
80.0	70.0	0.329737			
80.0	80.0	0.231120			
80.0	90.0	0.158202			
90.0	0.0	0.000000			
90.0	10.0	0.086814			
90.0	20.0	0.170680			
90.0	30.0	0.247436			
90.0	40.0	0.310308			
90.0	50.0	0.348438			
90.0	60.0	0.346410			
90.0	70.0	0.287735			
90.0	80.0	0.166004			
90.0	90.0	0.000000			
100.0	0.0	0.000000			
100.0	10.0	0.090234			
100.0	20.0	0.177826			
100.0	30.0	0.258931			
100.0	40.0	0.327081			
100.0	50.0	0.371678			
100.0	60.0	0.377594			
100.0	70.0	0.329737			
100.0	80.0	0.231120			
100.0	90.0	0.158202			
110.0	0.0	0.000000			
110.0	10.0	0.099444			
110.0	20.0	0.197117			
110.0	30.0	0.290063			
110.0	40.0	0.372655			
110.0	50.0	0.434827			
110.0	60.0	0.461294			
110.0	70.0	0.436802			
110.0	80.0	0.368370			
110.0	90.0	0.323290			
120.0	0.0	0.000000			
120.0	10.0	0.112145			
120.0	20.0	0.223869			
120.0	30.0	0.333637			
120.0	40.0	0.437218			
120.0	50.0	0.525336			
120.0	60.0	0.581464			
120.0	70.0	0.585533			
120.0	80.0	0.538516			
120.0	90.0	0.502853			
130.0	0.0	0.000000			

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130.0	10.0	0.126058	
130.0	20.0	0.253453	
130.0	30.0	0.382619	
130.0	40.0	0.511529	
130.0	50.0	0.632670	
130.0	60.0	0.728269	
130.0	70.0	0.769042	
130.0	80.0	0.740080	
130.0	90.0	0.705515	
140.0	0.0	0.000000	
140.0	10.0	0.139424	
140.0	20.0	0.282221	
140.0	30.0	0.431295	
140.0	40.0	0.587880	
140.0	50.0	0.748243	
140.0	60.0	0.895838	
140.0	70.0	0.989708	
140.0	80.0	0.982143	
140.0	90.0	0.939188	
150.0	0.0	0.000000	
150.0	10.0	0.150976	
150.0	20.0	0.307412	
150.0	30.0	0.474950	
150.0	40.0	0.659040	
150.0	50.0	0.862422	
150.0	60.0	1.075597	
150.0	70.0	1.249835	
150.0	80.0	1.275339	
150.0	90.0	1.199112	
160.0	0.0	0.000000	
160.0	10.0	0.159824	
160.0	20.0	0.326936	
160.0	30.0	0.509553	
160.0	40.0	0.717600	
160.0	50.0	0.962261	
160.0	60.0	1.248566	
160.0	70.0	1.535674	
160.0	80.0	1.614275	
160.0	90.0	1.409073	
170.0	0.0	0.000000	
170.0	10.0	0.165365	
170.0	20.0	0.339277	
170.0	30.0	0.531808	
170.0	40.0	0.756411	
170.0	50.0	1.031911	
170.0	60.0	1.380445	
170.0	70.0	1.788039	
170.0	80.0	1.929792	
170.0	90.0	1.210564	
180.0	0.0	0.000000	
180.0	10.0	0.167251	
180.0	20.0	0.343497	
180.0	30.0	0.539491	
180.0	40.0	0.770036	
180.0	50.0	1.057097	
180.0	60.0	1.430825	
180.0	70.0	1.894906	
180.0	80.0	2.065706	
180.0	90.0	0.000000	
190.0	0.0	0.000000	
190.0	10.0	0.165365	
190.0	20.0	0.339277	
190.0	30.0	0.531808	
190.0	40.0	0.756411	
190.0	50.0	1.031911	
190.0	60.0	1.380445	
190.0	70.0	1.788039	
190.0	80.0	1.929792	
190.0	90.0	1.210564	
200.0	0.0	0.000000	
200.0	10.0	0.159824	

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200.0	20.0	0.326936	
200.0	30.0	0.509553	
200.0	40.0	0.717600	
200.0	50.0	0.962261	
200.0	60.0	1.248566	
200.0	70.0	1.535674	
200.0	80.0	1.614275	
200.0	90.0	1.409073	
210.0	0.0	0.000000	
210.0	10.0	0.150976	
210.0	20.0	0.307412	
210.0	30.0	0.474950	
210.0	40.0	0.659040	
210.0	50.0	0.862422	
210.0	60.0	1.075597	
210.0	70.0	1.249835	
210.0	80.0	1.275339	
210.0	90.0	1.199112	
220.0	0.0	0.000000	
220.0	10.0	0.139424	
220.0	20.0	0.282221	
220.0	30.0	0.431295	
220.0	40.0	0.587880	
220.0	50.0	0.748243	
220.0	60.0	0.895838	
220.0	70.0	0.989708	
220.0	80.0	0.982143	
220.0	90.0	0.939188	
230.0	0.0	0.000000	
230.0	10.0	0.126058	
230.0	20.0	0.253453	
230.0	30.0	0.382619	
230.0	40.0	0.511530	
230.0	50.0	0.632670	
230.0	60.0	0.728269	
230.0	70.0	0.769042	
230.0	80.0	0.740080	
230.0	90.0	0.705515	
240.0	0.0	0.000000	
240.0	10.0	0.112145	
240.0	20.0	0.223869	
240.0	30.0	0.333637	
240.0	40.0	0.437218	
240.0	50.0	0.525336	
240.0	60.0	0.581464	
240.0	70.0	0.585533	
240.0	80.0	0.538516	
240.0	90.0	0.502853	
250.0	0.0	0.000000	
250.0	10.0	0.099444	
250.0	20.0	0.197117	
250.0	30.0	0.290063	
250.0	40.0	0.372655	
250.0	50.0	0.434827	
250.0	60.0	0.461294	
250.0	70.0	0.436802	
250.0	80.0	0.368370	
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270.0	30.0	0.247436		
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SGI IRIX 5.3 (UNIX)

tar format tape

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rw-rw-r-- 6523/425 Nov 12 16:34 1996 3dstress-1.2/
rw-rw-r-- 6523/425 Nov 12 16:32 1996 3dstress-1.2/bin/
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rw-rw-r-- 6523/425 2314 Nov 12 16:04 1996 3dstress-1.2/bin/bah.lin
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rw-rw-r-- 6523/425 7553 Nov 12 16:04 1996 3dstress-1.2/bin/cabutm.lin
rw-rw-r-- 6523/425 3238638 Nov 12 16:04 1996 3dstress-1.2/bin/dohren.lin
rw-rw-r-- 6523/425 1687149 Nov 12 16:04 1996 3dstress-1.2/bin/field4.vbl
rw-rw-r-- 6523/425 20120 Nov 12 16:04 1996 3dstress-1.2/bin/findStress
rw-rw-r-- 6523/425 91309 Nov 12 16:04 1996 3dstress-1.2/bin/flt010_bowRidge020.f
lt
rw-rw-r-- 6523/425 73409 Nov 12 16:04 1996 3dstress-1.2/bin/flt020_ghostDance020
.flr
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flr
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orm.vbl
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rw-rw-r-- 6523/425 1981 Nov 12 16:04 1996 3dstress-1.2/bin/test.lin
rw-rw-r-- 6523/425 44240 Nov 12 16:04 1996 3dstress-1.2/bin/test1.vbl
rw-rw-r-- 6523/425 6499 Nov 12 16:04 1996 3dstress-1.2/bin/test2.flr
rw-rw-r-- 6523/425 1257 Nov 12 16:04 1996 3dstress-1.2/bin/test2.lin
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rw-rw-r-- 6523/425 1107 Nov 12 16:04 1996 3dstress-1.2/bin/test_subrng.lin
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rw-rw-r-- 6523/425 11705 Nov 12 16:04 1996 3dstress-1.2/bin/threeflts.lin
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031.sc
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31.sc
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og.c++.v
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log.c++.v
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.c++.v
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log.c++.v
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B.c++.v
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ialog.c++.v
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.v
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ks.c++.v
r--r--r-- 6523/425 697 Nov 12 16:03 1996 3dstress-1.2/src/RCS/controlerCallbac
ks.hh.v
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r--r--r-- 6523/425 545 Nov 12 16:03 1996 3dstress-1.2/src/RCS/covObj.hh.v
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r--r--r--	6523/425	484	Nov 12 16:03 1996	3dstress-1.2/src/RCS/covWObj.hh,v	
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r--r--r--	6523/425	41859	Nov 12 16:19 1996	3dstress-1.2/src/RCS/mapCallbacks.c++,v	
r--r--r--	6523/425	1945	Nov 12 16:03 1996	3dstress-1.2/src/RCS/mapCallbacks.hh,v	
r--r--r--	6523/425	31049	Nov 12 16:03 1996	3dstress-1.2/src/RCS/mapClass.c++,v	
r--r--r--	6523/425	4321	Nov 12 16:03 1996	3dstress-1.2/src/RCS/mapClass.hh,v	
r--r--r--	6523/425	7384	Nov 12 16:19 1996	3dstress-1.2/src/RCS/mapOptionCB.c++,v	
r--r--r--	6523/425	1722	Nov 12 16:19 1996	3dstress-1.2/src/RCS/mapOptionCB.hh,v	
r--r--r--	6523/425	13540	Nov 12 16:19 1996	3dstress-1.2/src/RCS/mapOptionClass.c++,v	

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r--r--r--	6523/425	2182	Nov 12 16:19 1996	3dstress-1.2/src/RCS/mapOptionClass.hh,v	
r--r--r--	6523/425	494	Nov 12 16:03 1996	3dstress-1.2/src/RCS/mapOptionObj.hh,v	
r--r--r--	6523/425	48999	Nov 12 16:03 1996	3dstress-1.2/src/RCS/menuCallbacks.c++,v	
r--r--r--	6523/425	2239	Nov 12 16:03 1996	3dstress-1.2/src/RCS/menuCallbacks.hh,v	
r--r--r--	6523/425	21332	Nov 12 16:03 1996	3dstress-1.2/src/RCS/menuClass.c++,v	
r--r--r--	6523/425	2058	Nov 12 16:03 1996	3dstress-1.2/src/RCS/menuClass.hh,v	
r--r--r--	6523/425	1850	Nov 12 16:03 1996	3dstress-1.2/src/RCS/menuObj.hh,v	
r--r--r--	6523/425	5443	Nov 12 16:03 1996	3dstress-1.2/src/RCS/notice.c++,v	
r--r--r--	6523/425	1381	Nov 12 16:03 1996	3dstress-1.2/src/RCS/notice.hh,v	
r--r--r--	6523/425	11853	Nov 12 16:03 1996	3dstress-1.2/src/RCS/optionCallbacks.c++,v	
r--r--r--	6523/425	2035	Nov 12 16:03 1996	3dstress-1.2/src/RCS/optionCallbackObj.hh,v	
r--r--r--	6523/425	42654	Nov 12 16:03 1996	3dstress-1.2/src/RCS/optionClass.c++,v	
r--r--r--	6523/425	2673	Nov 12 16:03 1996	3dstress-1.2/src/RCS/optionClass.hh,v	
r--r--r--	6523/425	515	Nov 12 16:03 1996	3dstress-1.2/src/RCS/optionObj.hh,v	
r--r--r--	6523/425	16360	Nov 12 16:03 1996	3dstress-1.2/src/RCS/overlayClass.c++,v	
r--r--r--	6523/425	3366	Nov 12 16:03 1996	3dstress-1.2/src/RCS/overlayClass.hh,v	
r--r--r--	6523/425	28644	Nov 12 16:03 1996	3dstress-1.2/src/RCS/overlayDialog.c++,v	
r--r--r--	6523/425	1828	Nov 12 16:03 1996	3dstress-1.2/src/RCS/overlayDialog.hh,v	
r--r--r--	6523/425	1576	Nov 12 16:03 1996	3dstress-1.2/src/RCS/overlayObj.hh,v	
r--r--r--	6523/425	13834	Nov 12 16:03 1996	3dstress-1.2/src/RCS/overlayRemove.c++,v	
r--r--r--	6523/425	1854	Nov 12 16:03 1996	3dstress-1.2/src/RCS/overlayRemove.hh,v	
r--r--r--	6523/425	12498	Nov 12 16:03 1996	3dstress-1.2/src/RCS/overlayWidgetCB.c++,v	
r--r--r--	6523/425	936	Nov 12 16:03 1996	3dstress-1.2/src/RCS/overlayWidgetCB.hh,v	
r--r--r--	6523/425	19175	Nov 12 16:03 1996	3dstress-1.2/src/RCS/overlayWidgetClass.c++,v	
r--r--r--	6523/425	1754	Nov 12 16:03 1996	3dstress-1.2/src/RCS/overlayWidgetClass.hh,v	
r--r--r--	6523/425	867	Nov 12 16:03 1996	3dstress-1.2/src/RCS/ovlWObj.hh,v	
r--r--r--	6523/425	5149	Nov 12 16:03 1996	3dstress-1.2/src/RCS/pixButton.c++,v	
r--r--r--	6523/425	278683	Nov 12 16:03 1996	3dstress-1.2/src/RCS/plotClass.c++,v	
r--r--r--	6523/425	28998	Nov 12 16:03 1996	3dstress-1.2/src/RCS/plotClass.hh,v	
r--r--r--	6523/425	91801	Nov 12 16:03 1996	3dstress-1.2/src/RCS/plotClass_display.c++,v	
r--r--r--	6523/425	19270	Nov 12 16:03 1996	3dstress-1.2/src/RCS/plotClass_find.c++,v	
r--r--r--	6523/425	19201	Nov 12 16:03 1996	3dstress-1.2/src/RCS/plotClass_output.c++,v	
r--r--r--	6523/425	19753	Nov 12 16:03 1996	3dstress-1.2/src/RCS/plotClass_setDirPlunge.c++,v	
r--r--r--	6523/425	1501	Nov 12 16:03 1996	3dstress-1.2/src/RCS/plotObj.hh,v	
r--r--r--	6523/425	4205	Nov 12 16:03 1996	3dstress-1.2/src/RCS/readBin.c++,v	
r--r--r--	6523/425	10323	Nov 12 16:03 1996	3dstress-1.2/src/RCS/remove.c++,v	
r--r--r--	6523/425	1260	Nov 12 16:03 1996	3dstress-1.2/src/RCS/remove.hh,v	
r--r--r--	6523/425	12466	Nov 12 16:03 1996	3dstress-1.2/src/RCS/roseButtonCB.c++,v	
r--r--r--	6523/425	1790	Nov 12 16:03 1996	3dstress-1.2/src/RCS/roseButtonCB.hh,v	
r--r--r--	6523/425	29486	Nov 12 16:03 1996	3dstress-1.2/src/RCS/roseCallbacks.c++,v	
r--r--r--	6523/425	1636	Nov 12 16:03 1996	3dstress-1.2/src/RCS/roseCallbacks.hh,v	
r--r--r--	6523/425	33199	Nov 12 16:03 1996	3dstress-1.2/src/RCS/roseClass.c++,v	
r--r--r--	6523/425	4127	Nov 12 16:03 1996	3dstress-1.2/src/RCS/roseClass.hh,v	
r--r--r--	6523/425	1275	Nov 12 16:03 1996	3dstress-1.2/src/RCS/roseObj.hh,v	
r--r--r--	6523/425	2459	Nov 12 16:03 1996	3dstress-1.2/src/RCS/roseOptionCB.c++,v	

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r--r--r-- 6523/425	1083 Nov 12 16:03 1996 3dstress-1.2/src/RCS/roseOptionCB.hh,v	
r--r--r-- 6523/425	10275 Nov 12 16:03 1996 3dstress-1.2/src/RCS/roseOptionClass.c++v	
r--r--r-- 6523/425	1660 Nov 12 16:03 1996 3dstress-1.2/src/RCS/roseOptionClass.hh,v	
r--r--r-- 6523/425	495 Nov 12 16:03 1996 3dstress-1.2/src/RCS/roseOptionObj.hh,v	
r--r--r-- 6523/425	6481 Nov 12 16:03 1996 3dstress-1.2/src/RCS/rotClass.c++v	
r--r--r-- 6523/425	1768 Nov 12 16:03 1996 3dstress-1.2/src/RCS/rotClass.hh,v	
r--r--r-- 6523/425	12420 Nov 12 16:03 1996 3dstress-1.2/src/RCS/saveWindow.c++v	
r--r--r-- 6523/425	582 Nov 12 16:03 1996 3dstress-1.2/src/RCS/saveWindow.hh,v	
r--r--r-- 6523/425	5587 Nov 12 16:03 1996 3dstress-1.2/src/RCS/sceneClass.c++v	
r--r--r-- 6523/425	2230 Nov 12 16:03 1996 3dstress-1.2/src/RCS/sceneClass.hh,v	
r--r--r-- 6523/425	1507 Nov 12 16:03 1996 3dstress-1.2/src/RCS/sceneObj.hh,v	
r--r--r-- 6523/425	21711 Nov 12 16:03 1996 3dstress-1.2/src/RCS/surfButtonCB.c++v	
r--r--r-- 6523/425	1434 Nov 12 16:03 1996 3dstress-1.2/src/RCS/surfButtonCB.hh,v	
r--r--r-- 6523/425	48265 Nov 12 16:03 1996 3dstress-1.2/src/RCS/surfCallbacks.c++v	
r--r--r-- 6523/425	3132 Nov 12 16:03 1996 3dstress-1.2/src/RCS/surfCallbacks.hh,v	
r--r--r-- 6523/425	29331 Nov 12 16:03 1996 3dstress-1.2/src/RCS/surfClass.c++v	
r--r--r-- 6523/425	5009 Nov 12 16:03 1996 3dstress-1.2/src/RCS/surfClass.hh,v	
r--r--r-- 6523/425	1509 Nov 12 16:03 1996 3dstress-1.2/src/RCS/surfObj.hh,v	
r--r--r-- 6523/425	2497 Nov 12 16:03 1996 3dstress-1.2/src/RCS/surfOptionCB.c++v	
r--r--r-- 6523/425	682 Nov 12 16:03 1996 3dstress-1.2/src/RCS/surfOptionCB.hh,v	
r--r--r-- 6523/425	14751 Nov 12 16:03 1996 3dstress-1.2/src/RCS/surfOptionClass.c++v	
r--r--r-- 6523/425	1460 Nov 12 16:03 1996 3dstress-1.2/src/RCS/surfOptionClass.hh,v	
r--r--r-- 6523/425	504 Nov 12 16:03 1996 3dstress-1.2/src/RCS/surfOptionObj.hh,v	
r--r--r-- 6523/425	22110 Nov 12 16:03 1996 3dstress-1.2/src/RCS/vblFile.c++v	
r--r--r-- 6523/425	1771 Nov 12 16:03 1996 3dstress-1.2/src/RCS/vblFile.hh,v	
r--r--r-- 6523/425	7682 Nov 12 16:03 1996 3dstress-1.2/src/RCS/vblToFlt.c++v	
r--r--r-- 6523/425	1547 Nov 12 16:03 1996 3dstress-1.2/src/RCS/vblToFlt.hh,v	
r--r--r-- 6523/425	4884 Nov 12 16:03 1996 3dstress-1.2/src/RCS/vectorClass.c++v	
r--r--r-- 6523/425	2990 Nov 12 16:03 1996 3dstress-1.2/src/RCS/vectorClass.hh,v	
r--r--r-- 6523/425	8301 Nov 12 16:03 1996 3dstress-1.2/src/RCS/viewClass.c++v	
r--r--r-- 6523/425	4381 Nov 12 16:03 1996 3dstress-1.2/src/RCS/viewClass.hh,v	
r--r--r-- 6523/425	39436 Nov 12 16:03 1996 3dstress-1.2/src/RCS/viewNet.c++v	
r--r--r-- 6523/425	12750 Nov 12 16:03 1996 3dstress-1.2/src/RCS/viewNetGlobals.h,v	
r--r--r-- 6523/425	1500 Nov 12 16:03 1996 3dstress-1.2/src/RCS/viewObj.hh,v	
r--r--r-- 6523/425	52300 Nov 12 16:03 1996 3dstress-1.2/src/RCS/viewerButtonCB.c++v	
r--r--r-- 6523/425	2956 Nov 12 16:03 1996 3dstress-1.2/src/RCS/viewerButtonCB.h,v	
r--r--r-- 6523/425	102656 Nov 12 16:03 1996 3dstress-1.2/src/RCS/viewerCallbacks.c++v	
r--r--r-- 6523/425	3526 Nov 12 16:03 1996 3dstress-1.2/src/RCS/viewerCallbacks.hh,v	
r--r--r-- 6523/425	80488 Nov 12 16:03 1996 3dstress-1.2/src/RCS/viewerClass.c++v	
r--r--r-- 6523/425	8496 Nov 12 16:03 1996 3dstress-1.2/src/RCS/viewerClass.hh,v	
r--r--r-- 6523/425	1528 Nov 12 16:03 1996 3dstress-1.2/src/RCS/viewerObj.hh,v	
r--r--r-- 6523/425	25570 Nov 12 16:03 1996 3dstress-1.2/src/RCS/viewerOptionCB.c++v	
r--r--r-- 6523/425	4206 Nov 12 16:03 1996 3dstress-1.2/src/RCS/viewerOptionCB.h,v	
r--r--r-- 6523/425	57267 Nov 12 16:03 1996 3dstress-1.2/src/RCS/viewerOptionClass.c++v	
r--r--r-- 6523/425	4638 Nov 12 16:03 1996 3dstress-1.2/src/RCS/viewerOptionClass.h,v	
r--r--r-- 6523/425	512 Nov 12 16:03 1996 3dstress-1.2/src/RCS/viewerOptionObj.h,v	

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r--r--r-- 6523/425	13409 Nov 12 16:18 1996 3dstress-1.2/src/RCS/zobakClass.c++v	
r--r--r-- 6523/425	1370 Nov 12 16:18 1996 3dstress-1.2/src/RCS/zobakClass.hh,v	
r--r--r-- 6523/425	545 Nov 12 16:18 1996 3dstress-1.2/src/RCS/zobakObj.hh,v	
r--r--r-- 6523/425	3368 Nov 12 16:03 1996 3dstress-1.2/src/RlogHead_3dstress	
rw-rw-r-- 6523/425	81468 Nov 12 16:04 1996 3dstress-1.2/src/antemp.grd	
rw-rw-r-- 6523/425	1200000 Nov 12 16:04 1996 3dstress-1.2/src/antemp.xyz	
r--r--r-- 6523/425	6627 Nov 12 16:03 1996 3dstress-1.2/src/axesClass.c++	
r--r--r-- 6523/425	1961 Nov 12 16:03 1996 3dstress-1.2/src/axesClass.hh	
r--r--r-- 6523/425	1215 Nov 12 16:03 1996 3dstress-1.2/src/axesObj.hh	
r--r--r-- 6523/425	5828 Nov 12 16:03 1996 3dstress-1.2/src/boundingBox.c++	
r--r--r-- 6523/425	1725 Nov 12 16:03 1996 3dstress-1.2/src/boundingBox.hh	
r--r--r-- 6523/425	19278 Nov 12 18:20 1996 3dstress-1.2/src/cmdClass.c++	
r--r--r-- 6523/425	1741 Nov 12 16:03 1996 3dstress-1.2/src/cmdClass.hh	
r--r--r-- 6523/425	9788 Nov 12 16:20 1996 3dstress-1.2/src/cmdClass_magDialog.c++	
r--r--r-- 6523/425	1511 Nov 12 16:03 1996 3dstress-1.2/src/cmdClass_plotDialog.c++	
r--r--r-- 6523/425	10425 Nov 12 16:04 1996 3dstress-1.2/src/cmdClass_scaleCB.c++	
r--r--r-- 6523/425	1524 Nov 12 16:03 1996 3dstress-1.2/src/cmdClass_surfDialog.c++	
r--r--r-- 6523/425	19140 Nov 12 16:20 1996 3dstress-1.2/src/cmdClass_toggleCB.c++	
r--r--r-- 6523/425	8938 Nov 12 16:03 1996 3dstress-1.2/src/cmdClass_uncertDialog.c++	
r--r--r-- 6523/425	1292 Nov 12 16:03 1996 3dstress-1.2/src/cmdObj.hh	
r--r--r-- 6523/425	7641 Nov 12 16:04 1996 3dstress-1.2/src/controlClass.c++	
r--r--r-- 6523/425	804 Nov 12 16:03 1996 3dstress-1.2/src/controlClass.hh	
r--r--r-- 6523/425	3633 Nov 12 16:04 1996 3dstress-1.2/src/controlerCallbacks.c++	
r--r--r-- 6523/425	699 Nov 12 16:03 1996 3dstress-1.2/src/controlerCallbacks.h	
r--r--r-- 6523/425	6845 Nov 12 16:20 1996 3dstress-1.2/src/covClass.c++	
r--r--r-- 6523/425	1290 Nov 12 16:20 1996 3dstress-1.2/src/covClass.hh	
r--r--r-- 6523/425	11365 Nov 12 16:20 1996 3dstress-1.2/src/covModify.c++	
r--r--r-- 6523/425	509 Nov 12 16:04 1996 3dstress-1.2/src/covObj.hh	
r--r--r-- 6523/425	459 Nov 12 16:04 1996 3dstress-1.2/src/covObj.hh	
r--r--r-- 6523/425	9552 Nov 12 16:20 1996 3dstress-1.2/src/covWidgetCB.c++	
r--r--r-- 6523/425	970 Nov 12 16:20 1996 3dstress-1.2/src/covWidgetCB.hh	
r--r--r-- 6523/425	19485 Nov 12 16:21 1996 3dstress-1.2/src/covWidgetClass.c++	
r--r--r-- 6523/425	1499 Nov 12 16:21 1996 3dstress-1.2/src/covWidgetClass.hh	
r--r--r-- 6523/425	558 Nov 12 16:04 1996 3dstress-1.2/src/destroyFS.c++	
rw-rw-r-- 6523/425	3039 Nov 12 16:04 1996 3dstress-1.2/src/exit8.xpm	
r--r--r-- 6523/425	3801 Nov 12 16:04 1996 3dstress-1.2/src/fileSelect.c++	
r--r--r-- 6523/425	693 Nov 12 16:04 1996 3dstress-1.2/src/fileSelect.hh	
r--r--r-- 6523/425	8625 Nov 12 16:21 1996 3dstress-1.2/src/fileShower.c++	
r--r--r-- 6523/425	860 Nov 12 16:04 1996 3dstress-1.2/src/fileShower.hh	
r--r--r-- 6523/425	2742 Nov 12 16:03 1996 3dstress-1.2/src/findAngle.c++	
r--r--r-- 6523/425	177040 Nov 12 16:03 1996 3dstress-1.2/src/fontdef.hh	
r--r--r-- 6523/425	2473 Nov 12 16:21 1996 3dstress-1.2/src/gfxButtonCB.c++	
r--r--r-- 6523/425	1218 Nov 12 16:03 1996 3dstress-1.2/src/gfxButtonCB.hh	
r--r--r-- 6523/425	22449 Nov 12 16:04 1996 3dstress-1.2/src/gfxCallbacks.c++	
r--r--r-- 6523/425	1546 Nov 12 16:03 1996 3dstress-1.2/src/gfxCallbacks.hh	
r--r--r-- 6523/425	16439 Nov 12 16:21 1996 3dstress-1.2/src/gfxClass.c++	
r--r--r-- 6523/425	1783 Nov 12 16:04 1996 3dstress-1.2/src/gfxClass.hh	
r--r--r-- 6523/425	1213 Nov 12 16:04 1996 3dstress-1.2/src/gfxObj.hh	
r--r--r-- 6523/425	5624 Nov 12 16:04 1996 3dstress-1.2/src/gfxOptionCB.c++	
r--r--r-- 6523/425	1121 Nov 12 16:04 1996 3dstress-1.2/src/gfxOptionCB.hh	
r--r--r-- 6523/425	26770 Nov 12 16:22 1996 3dstress-1.2/src/gfxOptionClass.c++	
r--r--r-- 6523/425	1621 Nov 12 16:04 1996 3dstress-1.2/src/gfxOptionClass.hh	
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rw-rw-r-- 6523/425	3199 Nov 12 16:04 1996 3dstress-1.2/src/graph8.xpm	
r--r--r-- 6523/425	1585 Nov 12 16:22 1996 3dstress-1.2/src/graphButtonCB.c++	
r--r--r-- 6523/425	723 Nov 12 16:04 1996 3dstress-1.2/src/graphButtonCB.hh	
r--r--r-- 6523/425	41806 Nov 12 16:04 1996 3dstress-1.2/src/graphCallbacks.c++	
r--r--r-- 6523/425	2022 Nov 12 16:04 1996 3dstress-1.2/src/graphCallbacks.hh	
r--r--r-- 6523/425	14347 Nov 12 16:22 1996 3dstress-1.2/src/graphClass.c++	
r--r--r-- 6523/425	2397 Nov 12 16:04 1996 3dstress-1.2/src/graphClass.hh	
r--r--r-- 6523/425	1231 Nov 12 16:04 1996 3dstress-1.2/src/graphObj.hh	
rw-rw-r-- 6523/425	3156 Nov 12 16:04 1996 3dstress-1.2/src/help8.xpm	
r--r--r-- 6523/425	9516 Nov 12 16:22 1996 3dstress-1.2/src/helpWidget.c++	
r--r--r-- 6523/425	579 Nov 12 16:04 1996 3dstress-1.2/src/helpWidget.hh	

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rw-r--r--	6523/425	944	Nov 12 16:04 1996	3dstress-1.2/src/hourglass.xbm	
r--r--r--	6523/425	1551	Nov 12 16:04 1996	3dstress-1.2/src/infoWidget.c++	
r--r--r--	6523/425	504	Nov 12 16:04 1996	3dstress-1.2/src/infoWidget.hh	
r--r--r--	6523/425	48291	Nov 12 16:04 1996	3dstress-1.2/src/linFileClass.c++	
r--r--r--	6523/425	5398	Nov 12 16:04 1996	3dstress-1.2/src/linFileClass.hh	
r--r--r--	6523/425	1453	Nov 12 16:04 1996	3dstress-1.2/src/linObj.hh	
r--r--r--	6523/425	22677	Nov 12 16:22 1996	3dstress-1.2/src/lineClass.c++	
r--r--r--	6523/425	2593	Nov 12 16:04 1996	3dstress-1.2/src/lineClass.hh	
r--r--r--	6523/425	1233	Nov 12 16:04 1996	3dstress-1.2/src/lineObj.hh	
rw-rw-r--	6523/425	252	Nov 12 16:04 1996	3dstress-1.2/src/magnify2.xbm	
rw-r--r--	6523/425	3197	Nov 12 16:04 1996	3dstress-1.2/src/map8.xpm	
r--r--r--	6523/425	7561	Nov 12 16:22 1996	3dstress-1.2/src/mapButtonCB.c++	
r--r--r--	6523/425	1144	Nov 12 16:04 1996	3dstress-1.2/src/mapButtonCB.hh	
r--r--r--	6523/425	25009	Nov 12 16:22 1996	3dstress-1.2/src/mapCallbacks.c++	
r--r--r--	6523/425	1919	Nov 12 16:04 1996	3dstress-1.2/src/mapCallbacks.hh	
r--r--r--	6523/425	22176	Nov 12 16:23 1996	3dstress-1.2/src/mapClass.c++	
r--r--r--	6523/425	2580	Nov 12 16:04 1996	3dstress-1.2/src/mapClass.hh	
r--r--r--	6523/425	1063	Nov 12 16:04 1996	3dstress-1.2/src/mapObj.hh	
r--r--r--	6523/425	3016	Nov 12 16:23 1996	3dstress-1.2/src/mapOptionCB.c++	
r--r--r--	6523/425	970	Nov 12 16:23 1996	3dstress-1.2/src/mapOptionCB.hh	
r--r--r--	6523/425	8628	Nov 12 16:23 1996	3dstress-1.2/src/mapOptionClass.c++	
r--r--r--	6523/425	1055	Nov 12 16:23 1996	3dstress-1.2/src/mapOptionClass.hh	
r--r--r--	6523/425	479	Nov 12 16:04 1996	3dstress-1.2/src/mapOptionObj.hh	
r--r--r--	6523/425	5004	Nov 12 16:04 1996	3dstress-1.2/src/notice.c++	
r--r--r--	6523/425	1270	Nov 12 16:04 1996	3dstress-1.2/src/notice.hh	
rw-rw-r--	6523/425	3179	Nov 12 16:04 1996	3dstress-1.2/src/option8.xpm	
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r--r--r--	6523/425	1199	Nov 12 16:04 1996	3dstress-1.2/src/optionCallbacks.hh	
r--r--r--	6523/425	25927	Nov 12 16:23 1996	3dstress-1.2/src/optionClass.c++	
r--r--r--	6523/425	1866	Nov 12 16:04 1996	3dstress-1.2/src/optionClass.hh	
r--r--r--	6523/425	499	Nov 12 16:04 1996	3dstress-1.2/src/optionObj.hh	
r--r--r--	6523/425	9831	Nov 12 16:04 1996	3dstress-1.2/src/overlayClass.c++	
r--r--r--	6523/425	2184	Nov 12 16:04 1996	3dstress-1.2/src/overlayClass.hh	
r--r--r--	6523/425	1274	Nov 12 16:04 1996	3dstress-1.2/src/overlayObj.hh	
r--r--r--	6523/425	8194	Nov 12 16:04 1996	3dstress-1.2/src/overlayWidgetCB.c++	
r--r--r--	6523/425	927	Nov 12 16:04 1996	3dstress-1.2/src/overlayWidgetCB.hh	
r--r--r--	6523/425	16616	Nov 12 16:23 1996	3dstress-1.2/src/overlayWidgetClass.c	
++					
r--r--r--	6523/425	1447	Nov 12 16:04 1996	3dstress-1.2/src/overlayWidgetClass.h	
h					
r--r--r--	6523/425	531	Nov 12 16:04 1996	3dstress-1.2/src/ovlWObj.hh	
rw-rw-r--	6523/425	3198	Nov 12 16:04 1996	3dstress-1.2/src/plot8.xpm	
r--r--r--	6523/425	45391	Nov 12 16:04 1996	3dstress-1.2/src/plotClass.c++	
r--r--r--	6523/425	13525	Nov 12 16:04 1996	3dstress-1.2/src/plotClass.hh	
r--r--r--	6523/425	47330	Nov 12 16:04 1996	3dstress-1.2/src/plotClass_display.c+	
+					
r--r--r--	6523/425	10077	Nov 12 16:04 1996	3dstress-1.2/src/plotClass_findSlipV.	
c++					
r--r--r--	6523/425	17702	Nov 12 16:04 1996	3dstress-1.2/src/plotClass_setDirPlun	
ge.c++					
r--r--r--	6523/425	1216	Nov 12 16:04 1996	3dstress-1.2/src/plotObj.hh	
r--r--r--	6523/425	4204	Nov 12 16:04 1996	3dstress-1.2/src/readBin.c++	
r--r--r--	6523/425	10281	Nov 12 16:23 1996	3dstress-1.2/src/remove.c++	
r--r--r--	6523/425	1217	Nov 12 16:23 1996	3dstress-1.2/src/remove.hh	
rw-rw-r--	6523/425	3198	Nov 12 16:04 1996	3dstress-1.2/src/rose8.xpm	
r--r--r--	6523/425	3203	Nov 12 16:24 1996	3dstress-1.2/src/roseButtonCB.c++	
r--r--r--	6523/425	978	Nov 12 16:04 1996	3dstress-1.2/src/roseButtonCB.hh	
r--r--r--	6523/425	24589	Nov 12 16:04 1996	3dstress-1.2/src/roseCallbacks.c++	
r--r--r--	6523/425	1487	Nov 12 16:04 1996	3dstress-1.2/src/roseCallbacks.hh	
r--r--r--	6523/425	22771	Nov 12 16:24 1996	3dstress-1.2/src/roseClass.c++	
r--r--r--	6523/425	2703	Nov 12 16:04 1996	3dstress-1.2/src/roseClass.hh	
r--r--r--	6523/425	1135	Nov 12 16:04 1996	3dstress-1.2/src/roseObj.hh	
r--r--r--	6523/425	2158	Nov 12 16:04 1996	3dstress-1.2/src/roseOptionCB.c++	
r--r--r--	6523/425	782	Nov 12 16:04 1996	3dstress-1.2/src/roseOptionCB.hh	
r--r--r--	6523/425	8060	Nov 12 16:24 1996	3dstress-1.2/src/roseOptionClass.c++	
r--r--r--	6523/425	1109	Nov 12 16:04 1996	3dstress-1.2/src/roseOptionClass.hh	
r--r--r--	6523/425	482	Nov 12 16:04 1996	3dstress-1.2/src/roseOptionObj.hh	
r--r--r--	6523/425	6077	Nov 12 16:04 1996	3dstress-1.2/src/rotClass.c++	
r--r--r--	6523/425	1753	Nov 12 16:04 1996	3dstress-1.2/src/rotClass.hh	
r--r--r--	6523/425	341	Nov 12 16:04 1996	3dstress-1.2/src/runAddNotice	
r--r--r--	6523/425	158	Nov 12 16:04 1996	3dstress-1.2/src/runCp2	

Nov 13 1996 09:20		tape.list		Page 8	
r--r--r--	6523/425	143	Nov 12 16:04 1996	3dstress-1.2/src/runLoop	
r--r--r--	6523/425	950	Nov 12 16:05 1996	3dstress-1.2/src/runRlogHead	
rw-rw-r--	6523/425	42	Nov 12 16:04 1996	3dstress-1.2/src/runrh	
r--r--r--	6523/425	5991	Nov 12 16:04 1996	3dstress-1.2/src/saveWindow.c++	
r--r--r--	6523/425	554	Nov 12 16:04 1996	3dstress-1.2/src/saveWindow.hh	
r--r--r--	6523/425	3649	Nov 12 16:04 1996	3dstress-1.2/src/sceneClass.c++	
r--r--r--	6523/425	1945	Nov 12 16:04 1996	3dstress-1.2/src/sceneClass.hh	
r--r--r--	6523/425	1222	Nov 12 16:04 1996	3dstress-1.2/src/sceneObj.hh	
rw-rw-r--	6523/425	3180	Nov 12 16:04 1996	3dstress-1.2/src/sliders8.xpm	
rw-r--r--	6523/425	101	Nov 12 16:04 1996	3dstress-1.2/src/so_locations	
rw-r--r--	6523/425	0	Nov 12 16:04 1996	3dstress-1.2/src/so_locations012732	
rw-rw-r--	6523/425	3198	Nov 12 16:04 1996	3dstress-1.2/src/surf8.xpm	
r--r--r--	6523/425	2913	Nov 12 16:24 1996	3dstress-1.2/src/surfButtonCB.c++	
r--r--r--	6523/425	849	Nov 12 16:04 1996	3dstress-1.2/src/surfButtonCB.hh	
r--r--r--	6523/425	28093	Nov 12 16:24 1996	3dstress-1.2/src/surfCallbacks.c++	
r--r--r--	6523/425	1946	Nov 12 16:04 1996	3dstress-1.2/src/surfCallbacks.hh	
r--r--r--	6523/425	19500	Nov 12 16:24 1996	3dstress-1.2/src/surfClass.c++	
r--r--r--	6523/425	3120	Nov 12 16:04 1996	3dstress-1.2/src/surfClass.hh	
r--r--r--	6523/425	1210	Nov 12 16:04 1996	3dstress-1.2/src/surfObj.hh	
r--r--r--	6523/425	2475	Nov 12 16:04 1996	3dstress-1.2/src/surfOptionCB.c++	
r--r--r--	6523/425	667	Nov 12 16:04 1996	3dstress-1.2/src/surfOptionCB.hh	
r--r--r--	6523/425	13381	Nov 12 16:04 1996	3dstress-1.2/src/surfOptionClass.c++	
r--r--r--	6523/425	1159	Nov 12 16:04 1996	3dstress-1.2/src/surfOptionClass.hh	
r--r--r--	6523/425	482	Nov 12 16:04 1996	3dstress-1.2/src/surfOptionObj.hh	
r--r--r--	6523/425	19034	Nov 12 16:04 1996	3dstress-1.2/src/vblFile.c++	
r--r--r--	6523/425	1370	Nov 12 16:04 1996	3dstress-1.2/src/vblFile.hh	
r--r--r--	6523/425	3669	Nov 12 16:04 1996	3dstress-1.2/src/vectorClass.c++	
r--r--r--	6523/425	2194	Nov 12 16:04 1996	3dstress-1.2/src/vectorClass.hh	
r--r--r--	6523/425	6966	Nov 12 16:04 1996	3dstress-1.2/src/viewClass.c++	
r--r--r--	6523/425	4082	Nov 12 16:04 1996	3dstress-1.2/src/viewClass.hh	
r--r--r--	6523/425	18215	Nov 12 16:25 1996	3dstress-1.2/src/viewNet.c++	
r--r--r--	6523/425	15943	Nov 12 16:03 1996	3dstress-1.2/src/viewNet.c++.bak	
r--r--r--	6523/425	4985	Nov 12 16:25 1996	3dstress-1.2/src/viewNetGlobals.hh	
r--r--r--	6523/425	1215	Nov 12 16:04 1996	3dstress-1.2/src/viewObj.hh	
r--r--r--	6523/425	16312	Nov 12 16:25 1996	3dstress-1.2/src/viewerButtonCB.c++	
r--r--r--	6523/425	1410	Nov 12 16:04 1996	3dstress-1.2/src/viewerButtonCB.hh	
r--r--r--	6523/425	44482	Nov 12 16:26 1996	3dstress-1.2/src/viewerCallbacks.c++	
r--r--r--	6523/425	1876	Nov 12 16:04 1996	3dstress-1.2/src/viewerCallbacks.hh	
r--r--r--	6523/425	45659	Nov 12 16:26 1996	3dstress-1.2/src/viewerClass.c++	
r--r--r--	6523/425	4128	Nov 12 16:04 1996	3dstress-1.2/src/viewerClass.hh	
r--r--r--	6523/425	1232	Nov 12 16:04 1996	3dstress-1.2/src/viewerObj.hh	
r--r--r--	6523/425	19048	Nov 12 16:04 1996	3dstress-1.2/src/viewerOptionCB.c++	
r--r--r--	6523/425	2272	Nov 12 16:04 1996	3dstress-1.2/src/viewerOptionCB.hh	
r--r--r--	6523/425	44287	Nov 12 16:26 1996	3dstress-1.2/src/viewerOptionClass.c+	
+					
r--r--r--	6523/425	2660	Nov 12 16:04 1996	3dstress-1.2/src/viewerOptionClass	
r--r--r--	6523/425	494	Nov 12 16:04 1996	3dstress-1.2/src/viewerOptionObj.hh	
rw-rw-r--	6523/425	132	Nov 12 16:03 1996	3dstress-1.2/src/widgetGlobals.hh	
END OF TAPE					

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CC_MAN

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CC(1) Silicon Graphics CC(1)

NAME

CC, NCC, DCC - Delta/C++ compiler

SYNOPSIS

```
CC [ option ] ... file ...
NCC [ option ] ... file ...
DCC [ option ] ... file ...
```

DESCRIPTION

CC (and its synonym, NCC) compile C++ with a new integrated compiler frontend (i.e. not a translator to C), using a conventional (cfront-compatible) code generation style. DCC, the SGI Delta/C++ compiler, compiles C++ source files using Delta/C++ style code generation.

Note: The old cfront-based C++ compiler can be executed by specifying the -use_cfront option to CC, or by executing OCC. In the subsequent descriptions in this man page, CC will imply NCC.

For more information on using Delta/C++ , and installation instructions, please refer to the 'C++ Release Notes'.

CC and DCC, produce output files in the following formats: MIPS object code in elf format (the normal result), binary or symbolic ucode, ucode object files, and binary or symbolic assembly language.

By default, all three behave as if the option -xansi were on the command line (see -xansi in the OPTIONS section below).

-fullwarn

+w Does various extra checks and produces additional warnings that are normally suppressed by default. This option is recommended for all compiles during software development.

Burt Hark 11-13-96

Printed by rboenau from yosemite

```
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make      CC -O +w -fullwarn -DFUNCPROTO -DXTFUNCPROTO -I../libs -c linFileClass.c+
+         CC -O +w -fullwarn -DFUNCPROTO -DXTFUNCPROTO -I../libs -c surfClass.c++
         CC -O +w -fullwarn -DFUNCPROTO -DXTFUNCPROTO -I../libs -c surfCallbacks.c
++        CC -O +w -fullwarn -DFUNCPROTO -DXTFUNCPROTO -I../libs -c graphClass.c++
         CC -O +w -fullwarn -DFUNCPROTO -DXTFUNCPROTO -I../libs -c graphCallbacks.
c++       "graphCallbacks.c++", line 105: warning(3341): explicit type is missing ("int"
         assumed)
         extern font2;
         ^
         CC -O +w -fullwarn -DFUNCPROTO -DXTFUNCPROTO -I../libs -c viewerClass.c++
         CC -O +w -fullwarn -DFUNCPROTO -DXTFUNCPROTO -I../libs -c viewerCallbacks
.c++      CC -O +w -fullwarn -DFUNCPROTO -DXTFUNCPROTO -I../libs -c gfxCallbacks.c+
+         "gfxCallbacks.c++", line 224: warning(3341): explicit type is missing ("int"
         assumed)
         extern font1;
         ^
         CC -O +w -fullwarn -DFUNCPROTO -DXTFUNCPROTO -I../libs -c gfxClass.c++
         CC -O +w -fullwarn -DFUNCPROTO -DXTFUNCPROTO -I../libs -c viewClass.c++
         CC -O +w -fullwarn -DFUNCPROTO -DXTFUNCPROTO -I../libs -c sceneClass.c++
         CC -O +w -fullwarn -DFUNCPROTO -DXTFUNCPROTO -I../libs -c axesClass.c++
         CC -O +w -fullwarn -DFUNCPROTO -DXTFUNCPROTO -I../libs -c overlayClass.c+
+         CC -O +w -fullwarn -DFUNCPROTO -DXTFUNCPROTO -I../libs -c cmdClass.c++
         CC -O +w -fullwarn -DFUNCPROTO -DXTFUNCPROTO -I../libs -c plotClass.c++
"plotClass.c++", line 235: warning(3341): explicit type is missing ("int"
         assumed)
         extern font1;
         ^
         CC -O +w -fullwarn -DFUNCPROTO -DXTFUNCPROTO -I../libs -c lineClass.c++
"lineClass.c++", line 192: warning(3341): explicit type is missing ("int"
         assumed)
         extern font1;
         ^
         CC -O +w -fullwarn -DFUNCPROTO -DXTFUNCPROTO -I../libs -c boundBox.c++
         CC -O +w -fullwarn -DFUNCPROTO -DXTFUNCPROTO -I../libs -c remove.c++
         CC -O +w -fullwarn -DFUNCPROTO -DXTFUNCPROTO -I../libs -c vectorClass.c++
         CC -O +w -fullwarn -DFUNCPROTO -DXTFUNCPROTO -I../libs -c rotClass.c++
         CC -O +w -fullwarn -DFUNCPROTO -DXTFUNCPROTO -I../libs -c mapClass.c++
         CC -O +w -fullwarn -DFUNCPROTO -DXTFUNCPROTO -I../libs -c mapCallbacks.c+
+         CC -O +w -fullwarn -DFUNCPROTO -DXTFUNCPROTO -I../libs -c roseClass.c++
         CC -O +w -fullwarn -DFUNCPROTO -DXTFUNCPROTO -I../libs -c roseCallbacks.c
++        CC -O +w -fullwarn -DFUNCPROTO -DXTFUNCPROTO -I../libs -c roseButtonCB.c+
+         CC -O +w -fullwarn -DFUNCPROTO -DXTFUNCPROTO -I../libs -c viewerButtonCB.
c++      CC -O +w -fullwarn -DFUNCPROTO -DXTFUNCPROTO -I../libs -c gfxButtonCB.c++
         CC -O +w -fullwarn -DFUNCPROTO -DXTFUNCPROTO -I../libs -c surfButtonCB.c+
+         CC -O +w -fullwarn -DFUNCPROTO -DXTFUNCPROTO -I../libs -c controlClass.c+
+         CC -O +w -fullwarn -DFUNCPROTO -DXTFUNCPROTO -I../libs -c controlerCallba
cks.c++   CC -O +w -fullwarn -DFUNCPROTO -DXTFUNCPROTO -I../libs -c mapButtonCB.c++
         CC -O +w -fullwarn -DFUNCPROTO -DXTFUNCPROTO -I../libs -c optionClass.c++
         CC -O +w -fullwarn -DFUNCPROTO -DXTFUNCPROTO -I../libs -c optionCallbacks
.c++      CC -O +w -fullwarn -DFUNCPROTO -DXTFUNCPROTO -I../libs -c covClass.c++
         CC -O +w -fullwarn -DFUNCPROTO -DXTFUNCPROTO -I../libs -c graphButtonCB.c
```

```
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C++       CC -O +w -fullwarn -DFUNCPROTO -DXTFUNCPROTO -I../libs -c gfxOptionClass.
         CC -O +w -fullwarn -DFUNCPROTO -DXTFUNCPROTO -I../libs -c gfxOptionCB.c++
         CC -O +w -fullwarn -DFUNCPROTO -DXTFUNCPROTO -I../libs -c viewerOptionCla
ss.c++    CC -O +w -fullwarn -DFUNCPROTO -DXTFUNCPROTO -I../libs -c viewerOptionCB.
c++      CC -O +w -fullwarn -DFUNCPROTO -DXTFUNCPROTO -I../libs -c surfOptionClass
.c++      CC -O +w -fullwarn -DFUNCPROTO -DXTFUNCPROTO -I../libs -c surfOptionCB.c+
+         CC -O +w -fullwarn -DFUNCPROTO -DXTFUNCPROTO -I../libs -c mapOptionClass.
c++      CC -O +w -fullwarn -DFUNCPROTO -DXTFUNCPROTO -I../libs -c mapOptionCB.c++
         CC -O +w -fullwarn -DFUNCPROTO -DXTFUNCPROTO -I../libs -c covWidgetClass.
c++      CC -O +w -fullwarn -DFUNCPROTO -DXTFUNCPROTO -I../libs -c covWidgetCB.
         CC -O +w -fullwarn -DFUNCPROTO -DXTFUNCPROTO -I../libs -c overlayWidgetC
ass.c++   CC -O +w -fullwarn -DFUNCPROTO -DXTFUNCPROTO -I../libs -c overlayWidgetCB
.c++      CC -O +w -fullwarn -DFUNCPROTO -DXTFUNCPROTO -I../libs -c roseOptionClass
.c++      CC -O +w -fullwarn -DFUNCPROTO -DXTFUNCPROTO -I../libs -c roseOptionCB.c+
+         CC -O +w -fullwarn -DFUNCPROTO -DXTFUNCPROTO -I../libs -c vblFile.c++
         CC -O +w -fullwarn -DFUNCPROTO -DXTFUNCPROTO -I../libs -c fileShower.c++
         CC -O +w -fullwarn -DFUNCPROTO -DXTFUNCPROTO -I../libs -c destroyFS.c++
         CC -O +w -fullwarn -DFUNCPROTO -DXTFUNCPROTO -I../libs -c saveWindow.c++
         CC -O +w -fullwarn -DFUNCPROTO -DXTFUNCPROTO -I../libs -c infoWidget.c++
         CC -O +w -fullwarn -DFUNCPROTO -DXTFUNCPROTO -I../libs -c helpWidget.c++
         CC -O +w -fullwarn -DFUNCPROTO -DXTFUNCPROTO -I../libs -c notice.c++
         CC -O +w -fullwarn -DFUNCPROTO -DXTFUNCPROTO -I../libs -c fileSelect.c++
         CC -O +w -fullwarn -DFUNCPROTO -DXTFUNCPROTO -I../libs viewNet.c++ -o ../
bin/3dstress linFileClass.o surfClass.o surfCallbacks.o graphClass.o graphCallba
cks.o viewerClass.o viewerCallbacks.o gfxCallbacks.o gfxClass.o viewClass.o scene
Class.o axesClass.o overlayClass.o cmdClass.o plotClass.o lineClass.o boundBox.o
remove.o vectorClass.o rotClass.o mapClass.o mapCallbacks.o roseClass.o roseCal
lbacks.o roseButtonCB.o viewerButtonCB.o gfxButtonCB.o surfButtonCB.o controlCla
ss.o controlerCallbacks.o mapButtonCB.o optionClass.o optionCallbacks.o covClass.
o graphButtonCB.o gfxOptionClass.o gfxOptionCB.o viewerOptionClass.o viewerOptio
nCB.o surfOptionClass.o surfOptionCB.o mapOptionClass.o mapOptionCB.o covWidgetC
lass.o covWidgetCB.o overlayWidgetClass.o overlayWidgetCB.o roseOptionClass.o ros
eOptionCB.o vblFile.o fileShower.o destroyFS.o saveWindow.o infoWidget.o helpWidg
et.o notice.o fileSelect.o -L../libs -lGLU -lGLw -lXm -lXt -lGL -lX11 -lm -lXp
Make all completed.
```

SOFTWARE PROBLEM/CHANGE REPORT

01. SPCR Number: GLGP-SPCR-101		
02. Project Title: Structural Deformation Code Development		Project Number: 20-5708-472
03. SPCR Title: 3DStress, Version 1.2		
04. AFFECTED SOFTWARE AND/OR DOCUMENTATION		
3DStress Software, User's Manual, Installation Test Procedure, Design Verification Report, Software Requirements Description		
05. DESCRIPTION OF PROBLEM/CHANGE		
Revised graphical user interface and added new features described in software requirements description for version 1.2.		
06. PROBLEM SOLUTION/NEED FOR CHANGE		
Modifications were requested by users of 3DStress, Version 1.1.		
07. Originator: B. Henderson	Title: Sr. Research Engineer	Date: 10/17/96
PROJECT		
08. Need by Date:	09. Approved:	Disapproved:
10. Software Developer: B. Henderson	<i>Brent Henderson</i>	Date: 10/18/96
11. Element Manager: L. McKague	<i>L. McKague</i>	Date: 10/21/96
12. IMPLEMENTED SOLUTION		
Implemented modifications to software and documentation.		
13. Implemented By: B. Henderson		Date: 11/12/96

Design Verification Report for 3DStress Version 1.2

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November 11, 1996

1. Introduction

3DStress is a software application for computing the slip and dilation tendency of faults and fractures. This report specifies the test procedures and results used to verify the correct functionality of 3DStress, version 1.2. The design verification report is required by CNWRA Technical Operating Procedure TOP-018, Revision 4, section 5.5. These tests verify the functionality of the features described in 3DStress, version 1.2, Software Requirements Document (SRD), August 6, 1996 (stored in the QA folder for 3DStress, version 1.2). This report includes the test procedures for testing the software functions, technical basis, data flow and interface, programming language, hardware platforms, and graphic output devices specified in the SRD. The results from conducting these tests are included in the summary of this report.

2. Software functions

The following test procedures are used to verify correct software functionality of 3DStress. Several windows are displayed by 3DStress including a Tendency Plot viewer, Tendency Surface viewer, Sliders, Graph viewer, Options, 2D viewer, and 3D viewer. See the 3DStress users manual for descriptions of these windows and more detailed instructions on the use of 3DStress.

2.1 Test graphical user interface (GUI) control of stress magnitudes and orientations.

- a. Open the Sliders and Tendency Plot windows.
- b. Using the mouse to operate the sliders, adjust the input stress magnitudes and orientations.
- c. Verify that the Tendency Plot colors change as the input stress values are modified.

2.2 Compute slip tendency, dilation tendency, and slip direction for a fault surface orientation given specific 3D stress conditions.

- a. Open the Sliders, Options, and Tendency Plot windows.
- b. Using the mouse to operate the sliders, adjust the input stress magnitudes and orientations to each of the values in the following table.
- c. Switch between slip and dilation tendency using the buttons on the Options window.
- d. For each input stress condition, verify the slip tendency, dilation tendency, and slip directions according to the table below.

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```
# Program: 3dstress:
# 3dstress 09-30-96 Rev 1.2
# Execution date: Wed Sep 25 14:58:25 CDT 1996
# Test file: tcasel.dat
# sigmaX sigmaY sigmaZ    rotX rotY rotZ    fltStrike fltDip    slipAzimuth slipPlunge
slipTendency
S 100  60  10  R  0  0  0  F 144  75    SLIP_VECTOR 312  36  SLIPTEND 0.91
S  60 100  10  R  0  0  0  F 144  75    SLIP_VECTOR 322   6  SLIPTEND 0.98
S  10 100  60  R  0  0  0  F 144  75    SLIP_VECTOR 156  39  SLIPTEND 0.35
S 100  10  60  R  0  0  0  F 144  75    SLIP_VECTOR 153  30  SLIPTEND 0.58
S  10  60 100  R  0  0  0  F 144  75    SLIP_VECTOR 308  44  SLIPTEND 0.33
S  60  10 100  R  0  0  0  F 144  75    SLIP_VECTOR 323   2  SLIPTEND 0.61
S 100  60  10  R  0  0  0  F 173  54    SLIP_VECTOR 274  53  SLIPTEND 1.03
S  60 100  10  R  0  0  0  F 173  54    SLIP_VECTOR 295  49  SLIPTEND 0.88
S  10 100  60  R  0  0  0  F 173  54    SLIP_VECTOR 247  52  SLIPTEND 0.57
S 100  10  60  R  0  0  0  F 173  54    SLIP_VECTOR 239  51  SLIPTEND 0.27
S  10  60 100  R  0  0  0  F 173  54    SLIP_VECTOR 271  53  SLIPTEND 0.62
S  60  10 100  R  0  0  0  F 173  54    SLIP_VECTOR 302  46  SLIPTEND 0.24
S 100  60  10  R  0  0  0  F  36  51    SLIP_VECTOR  86  43  SLIPTEND 0.71
S  60 100  10  R  0  0  0  F  36  51    SLIP_VECTOR  45  12  SLIPTEND 0.71
S  10 100  60  R  0  0  0  F  36  51    SLIP_VECTOR 162  44  SLIPTEND 0.71
S 100  10  60  R  0  0  0  F  36  51    SLIP_VECTOR 172  40  SLIPTEND 0.51
S  10  60 100  R  0  0  0  F  36  51    SLIP_VECTOR  93  46  SLIPTEND 0.72
S  60  10 100  R  0  0  0  F  36  51    SLIP_VECTOR  40   5  SLIPTEND 0.51
```


2.3 Display 2D representations of faults colored by slip or dilation tendency.

- Open the 2D Map viewer, Tendency Plot, and Sliders windows.
- Load the following Lin file in the 2D Map viewer (angles45.lin):

```

100
  0.00      50.00
  0.00     500.00
END
101
  35.36     35.36
 353.55    353.55
END
102
  50.00      0.00
 500.00      0.00
END
103
  35.36    -35.36
 353.55   -353.55
END
104
  0.00     -50.00
  0.00   -500.00
END
105
 -35.36    -35.36
-353.55   -353.55
END
106
 -50.00      0.00
-500.00      0.00
END
107
 -35.36     35.36
-353.55    353.55
END
END

```

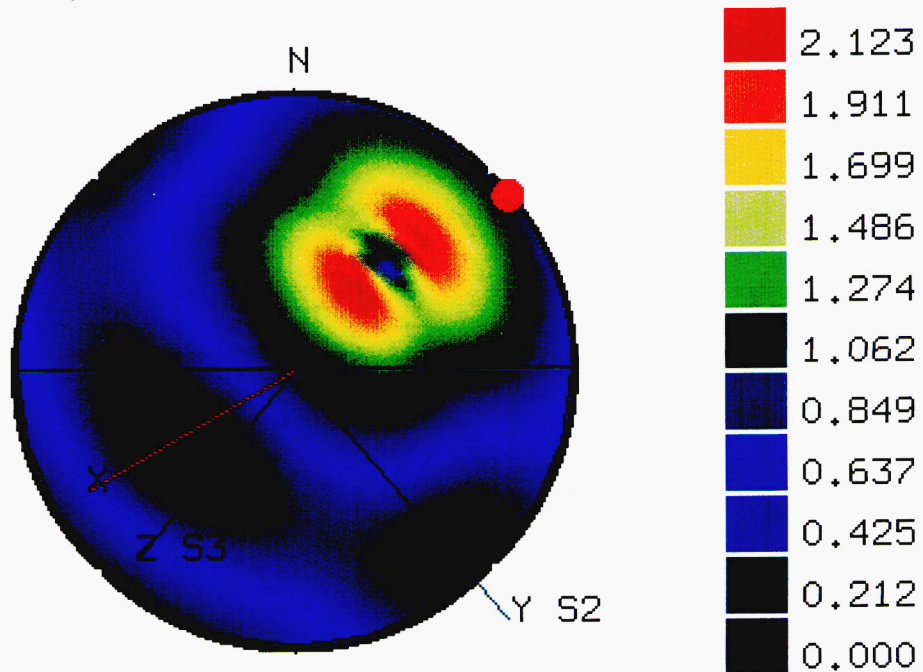
- c. Press the Reset button in the Sliders window. Then set the sliders in the following order: X Plunge slider to 45, X Direction slider to 240, and Y Direction slider to 140. Set the X Magnitude to 100, the Y Magnitude to 50, and the Z Magnitude to 5. Verify that the following values are displayed in the Tendency Plot window:

	Magnitude	Direction	Plunge
X	100	240	45
Y	50	140	10
Z	5	40	43

The direction and plunge values in the Tendency Plot and Sliders windows may not be identical. The plunge values in the Sliders window range from -90 to 90 to enable all possible 3D stress orientations. The plunge values in the Tendency Plot window range from 0 to 90 in order to show the location of the stress axes in the lower hemisphere plot.

- d. Verify that the Tendency Plot viewer appears to be colored similar to the figure below.

Slip Tendency Plot



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- e. Select the Options button on the 2D Map viewer window and select the Color Lines By Max Along Strike and the Browse Data button. Verify that the data matches the following values and that the lines in the 2D Map viewer are colored similar to the figure below.

```
#Created by: @(#)3dstress 09-30-96 Rev 1.2
#Date: Thu Oct 3 11:24:22 1996
```

```
#Generated by: Map Viewer
#Loaded file: angles45.lin
```

```
      Mag      Dir      Plng
SX  100 240  45
SY   50 140  10
SZ    5  40  43
```

```
#X-Y-Tendency-Strike
```

```
100
0.000000 50.000000 NULL NULL
0.000000 500.000000 1.283921 0.0
END
```

```
101
35.360000 35.360000 NULL NULL
353.550000 353.550000 0.876329 45.0
END
```

```
102
50.000000 0.000000 NULL NULL
500.000000 0.000000 1.525768 90.0
END
```

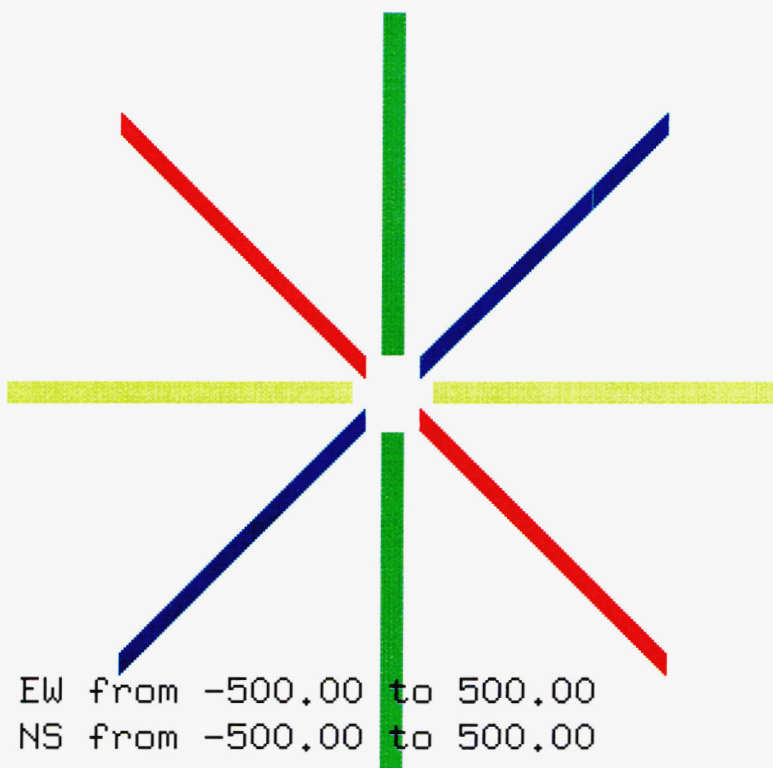
```
103
35.360000 -35.360000 NULL NULL
353.550000 -353.550000 2.105636 135.0
END
```

```
104
0.000000 -50.000000 NULL NULL
0.000000 -500.000000 1.283921 0.0
END
```

```
105
-35.360000 -35.360000 NULL NULL
-353.550000 -353.550000 0.876329 45.0
END
```

```
106
-50.000000 0.000000 NULL NULL
-500.000000 0.000000 1.525768 90.0
END
```

```
107
-35.360000 35.360000 NULL NULL
-353.550000 353.550000 2.105636 135.0
END
END
```



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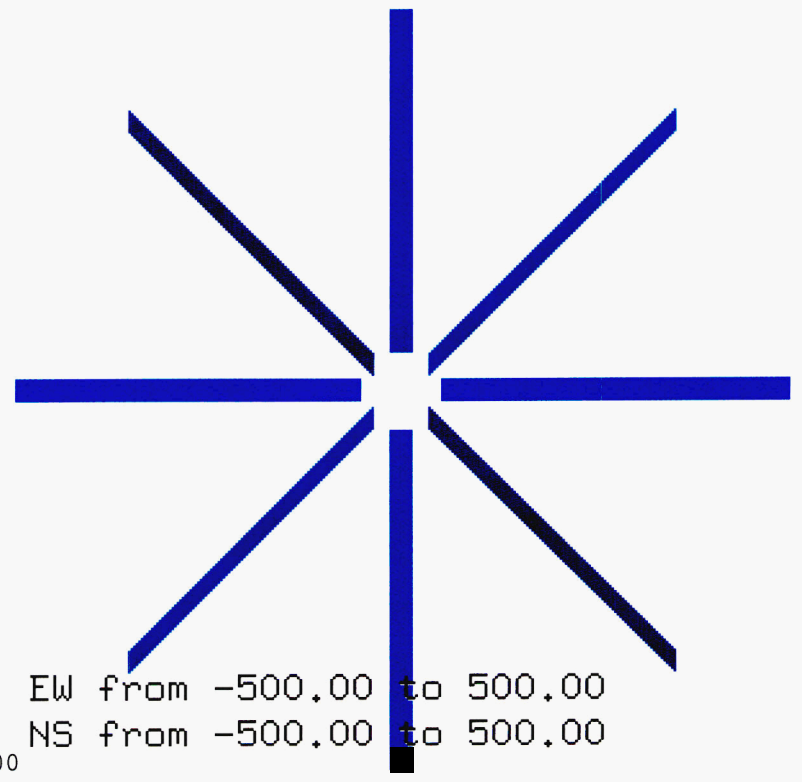
f. Select the Options button on the 2D Map viewer window and select the Color Lines By Dip Scale option, Dip Direction East, and Fault Dip Scale 30. Verify that the data matches the following values and that the lines in the 2D Map viewer are colored similar to the figure below.

```
#Created by: @(#)3dstress 09-30-96 Rev 1.2
#Date: Thu Oct 3 11:26:47 1996
```

```
#Generated by: Map Viewer
#Loaded file: angles45.lin
```

	Mag	Dir	Plng
SX	100	240	45
SY	50	140	10
SZ	5	40	43

```
#X-Y-Tendency-Strike
100
0.000000 50.000000 NULL NULL
0.000000 500.000000 0.374165 0.00
END
101
35.360000 35.360000 NULL NULL
353.550000 353.550000 0.719862 45.00
END
102
50.000000 0.000000 NULL NULL
500.000000 0.000000 0.421486 90.00
END
103
35.360000 -35.360000 NULL NULL
353.550000 -353.550000 0.254490 135.00
END
104
0.000000 -50.000000 NULL NULL
0.000000 -500.000000 0.374165 0.00
END
105
-35.360000 -35.360000 NULL NULL
-353.550000 -353.550000 0.719862 45.00
END
106
-50.000000 0.000000 NULL NULL
-500.000000 0.000000 0.421486 90.00
END
107
-35.360000 35.360000 NULL NULL
-353.550000 353.550000 0.254490 135.00
END
END
```



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g. Select the Options button on the 2D Map viewer window and select the Color Lines By Dip Angle option, Dip Direction West, and Fault Dip Scale 30. Verify that the data matches the following values and that the lines in the 2D Map viewer are colored similar to the figure below.

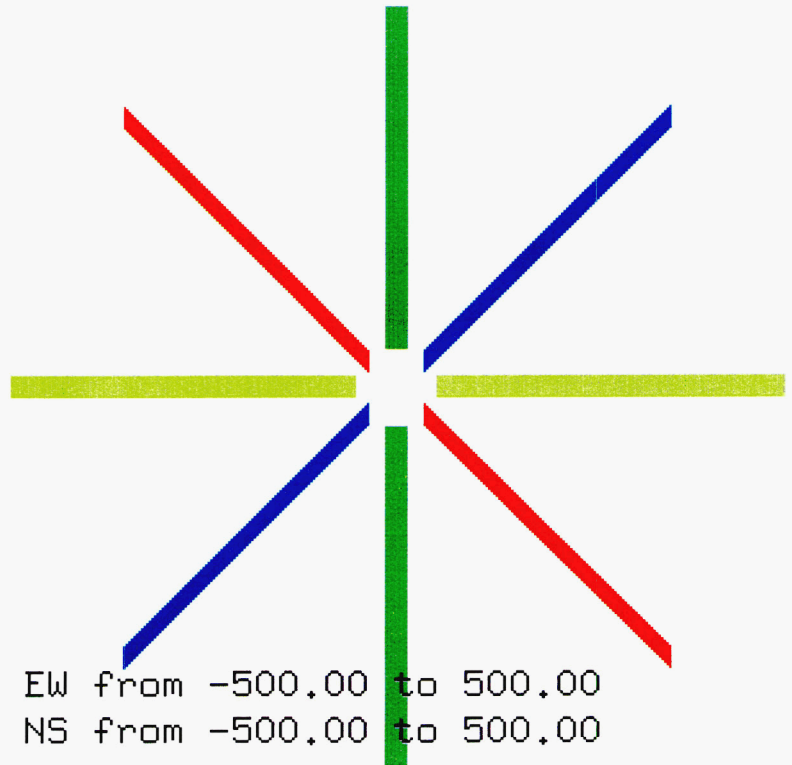
```
#Created by: @(#)3dstress 09-30-96 Rev 1.2
#Date: Thu Oct 3 11:27:08 1996
```

```
#Generated by: Map Viewer
#Loaded file: angles45.lin
```

	Mag	Dir	Plng
SX	100	240	45
SY	50	140	10
SZ	5	40	43

```
#X-Y-Tendency-Strike
```

```
100
0.000000 50.000000 NULL NULL
0.000000 500.000000 1.283921 0.0
END
101
35.360000 35.360000 NULL NULL
353.550000 353.550000 0.781086 45.0
END
102
50.000000 0.000000 NULL NULL
500.000000 0.000000 1.481839 90.0
END
103
35.360000 -35.360000 NULL NULL
353.550000 -353.550000 2.026368 135.0
END
104
0.000000 -50.000000 NULL NULL
0.000000 -500.000000 1.283921 0.0
END
105
-35.360000 -35.360000 NULL NULL
-353.550000 -353.550000 0.781086 45.0
END
106
-50.000000 0.000000 NULL NULL
-500.000000 0.000000 1.481839 90.0
END
107
-35.360000 35.360000 NULL NULL
-353.550000 353.550000 2.026368 135.0
END
END
```



2.4 Display 3D representations of faults colored by slip or dilation tendency.

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- Open the 3D Fault viewer, Tendency Plot, Options, and Sliders windows.
- Load the following VBL files in the 3D Fault viewer (tc1.vbl, tc2.vbl, tc3.vbl, tc4.vbl):

File: tc1.vbl

```
#3DMove ASCII Data File V2.00a
Model_Name BSP$Import
Type TIME
Unit METER
Eye_Point 0.0924656 -0.075081 0.0137349
Look_At 0.051498 0.0193591 -0.0110598
X_limits 0 0.0982467
Y_limits 0 0.0332681
Z_limits -0.0197094 0.000358652
Translation 0 0 0
Rotation 0 0
Scale 1 1 1
Num_Of_Surfaces 1
Begin_Surface
Surface_Name Fault_15
Surface_Colour 16777215
Num_Of_Surface_Lines 0
Num_Of_Patches 1
Begin_Patch
Patch_Name Patch
Patch_Colour 16777215
Num_Of_Triangles 2
0 1 2 -1 -1 -1
0 2 3 -1 -1 -1
End_Patch
Num_Of_Vertices 4
0.0 0.0 0.0
10.0 0.0 0.0
10.0 10.0 0.0
0.0 10.0 0.0
End_Surface
Num_Of_Wells 0
```

File: tc2.vbl

```
#3DMove ASCII Data File V2.00a
Model_Name BSP$Import
Type TIME
Unit METER
Eye_Point 0.0924656 -0.075081 0.0137349
Look_At 0.051498 0.0193591 -0.0110598
X_limits 0 0.0982467
Y_limits 0 0.0332681
Z_limits -0.0197094 0.000358652
Translation 0 0 0
Rotation 0 0
Scale 1 1 1
Num_Of_Surfaces 1
Begin_Surface
Surface_Name Fault_15
Surface_Colour 16777215
Num_Of_Surface_Lines 0
Num_Of_Patches 1
Begin_Patch
Patch_Name Patch
Patch_Colour 16777215
Num_Of_Triangles 2
0 1 2 -1 -1 -1
0 2 3 -1 -1 -1
End_Patch
Num_Of_Vertices 4
0.0 0.0 0.0
0.0 10.0 0.0
0.0 10.0 10.0
0.0 0.0 10.0
End_Surface
Num_Of_Wells 0
```

File: tc3.vbl

```
#3DMove ASCII Data File V2.00a
Model_Name BSP$Import
Type TIME
Unit METER
Eye_Point    0.0924656 -0.075081 0.0137349
Look_At 0.051498 0.0193591 -0.0110598
X_limits  0 0.0982467
Y_limits  0 0.0332681
Z_limits  -0.0197094 0.000358652
Translation 0 0 0
Rotation 0 0
Scale 1 1 1
Num_Of_Surfaces 1
Begin_Surface
Surface_Name Fault_15
Surface_Colour 16777215
Num_Of_Surface_Lines 0
Num_Of_Patches 1
Begin_Patch
Patch_Name Patch
Patch_Colour 16777215
Num_Of_Triangles 2
0 1 2 -1 -1 -1
0 2 3 -1 -1 -1
End_Patch
Num_Of_Vertices 4
0.0    0.0    0.0
10.0   10.0    0.0
15.0   10.0    8.7
5.0    0.0    8.7
End_Surface
Num_Of_Wells 0
```

File: tc4.vbl

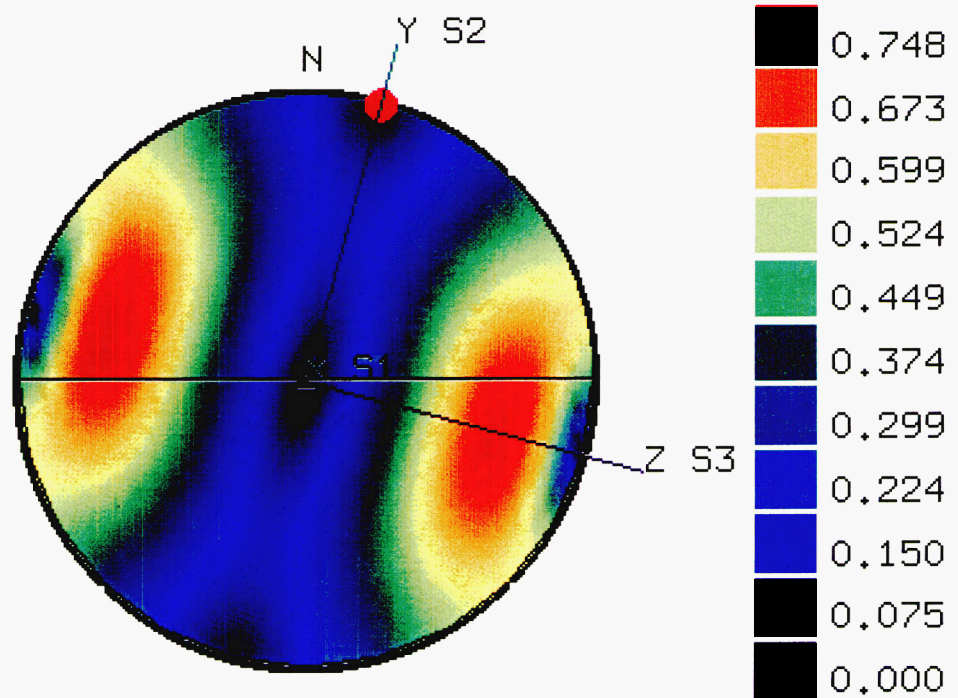
```
#3DMove ASCII Data File V2.00a
Model_Name BSP$Import
Type TIME
Unit METER
Eye_Point    0.0924656 -0.075081 0.0137349
Look_At 0.051498 0.0193591 -0.0110598
X_limits  0 0.0982467
Y_limits  0 0.0332681
Z_limits  -0.0197094 0.000358652
Translation 0 0 0
Rotation 0 0
Scale 1 1 1
Num_Of_Surfaces 1
Begin_Surface
Surface_Name Fault_15
Surface_Colour 16777215
Num_Of_Surface_Lines 0
Num_Of_Patches 1
Begin_Patch
Patch_Name Patch
Patch_Colour 16777215
Num_Of_Triangles 2
0 1 2 -1 -1 -1
0 2 3 -1 -1 -1
End_Patch
Num_Of_Vertices 4
10.0    0.0    0.0
10.0   10.0    0.0
15.0   10.0    8.7
15.0    0.0    8.7
End_Surface
Num_Of_Wells 0
```


c. Using the sliders in the Sliders window, set the stress state as follows:

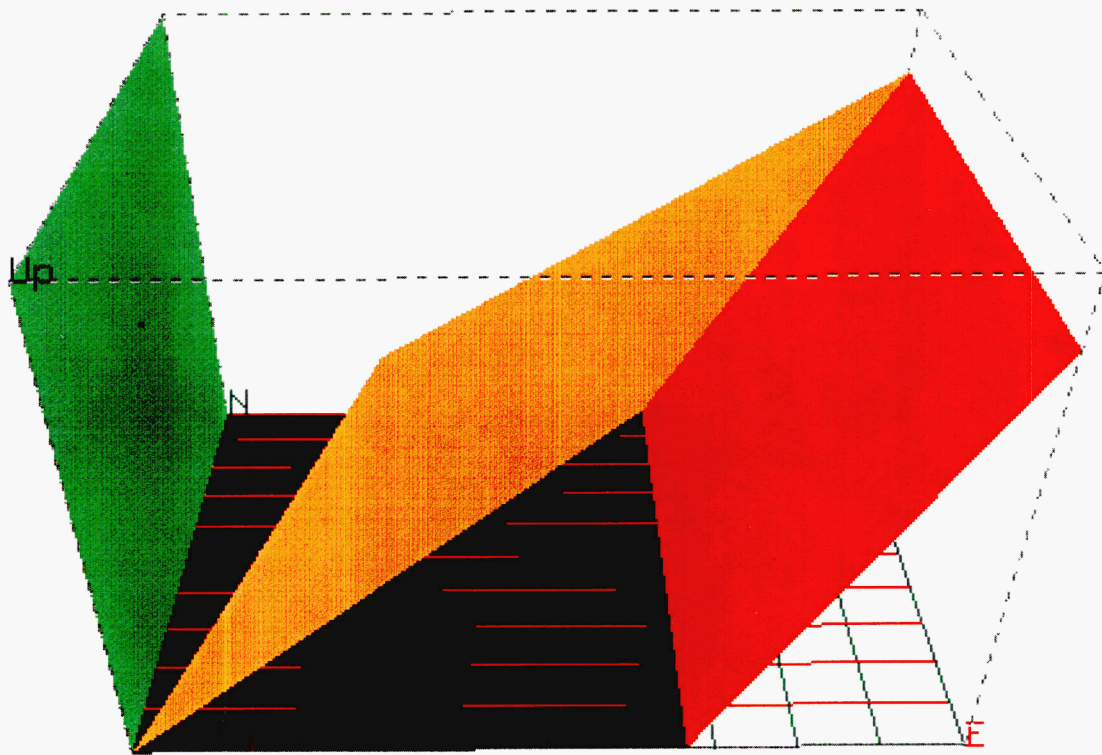
	Magnitude	Direction	Plunge
X	40	15	90
Y	30	15	0
Z	10	105	0

d. Verify that the Tendency Plot viewer appears to be colored similar to the figure below.

Slip Tendency Plot



e. Verify that the surfaces in the 3D viewer appear to be colored similar to the figure below. 38/138



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f. Select the Options button on the 3D Fault Viewer window and select the Browse Data button. Verify that the values in the Browse Data window match the following values.

```
#Created by: @(#)3dstress 09-30-96 Rev 1.2
#Date: Mon Oct 7 16:51:02 1996
```

```
#Generated by: 3D Fault Viewer
```

```
      Mag      Dir      Plng
SX    40    15    90
SY     30    15     0
SZ     10   105     0
```

```
X-Y-Z-Slip_Tendency-Slip_AZ-Slip_Plng
```

```
-----
```

```
File Name: tc1.vbl
```

```
-----
```

```
0.000000 0.000000 0.000000 0.000000 15.000000 0.000000
10.000000 0.000000 0.000000 NULL NULL NULL
10.000000 10.000000 0.000000 NULL NULL NULL
0.000000 0.000000 0.000000 0.000000 15.000000 0.000000
10.000000 10.000000 0.000000 NULL NULL NULL
0.000000 10.000000 0.000000 NULL NULL NULL
```

```
-----
```

```
File Name: tc2.vbl
```

```
-----
```

```
0.000000 0.000000 0.000000 0.440927 0.000005 0.000001
0.000000 10.000000 0.000000 NULL NULL NULL
0.000000 10.000000 10.000000 NULL NULL NULL
0.000000 0.000000 0.000000 0.440927 0.000005 0.000001
0.000000 10.000000 10.000000 NULL NULL NULL
0.000000 0.000000 10.000000 NULL NULL NULL
```

```
-----
```

```
File Name: tc3.vbl
```

```
-----
```

```
0.000000 0.000000 0.000000 0.638988 247.252731 42.979954
10.000000 10.000000 0.000000 NULL NULL NULL
15.000000 10.000000 8.700000 NULL NULL NULL
0.000000 0.000000 0.000000 0.638988 247.252731 42.979954
15.000000 10.000000 8.700000 NULL NULL NULL
5.000000 0.000000 8.700000 NULL NULL NULL
```

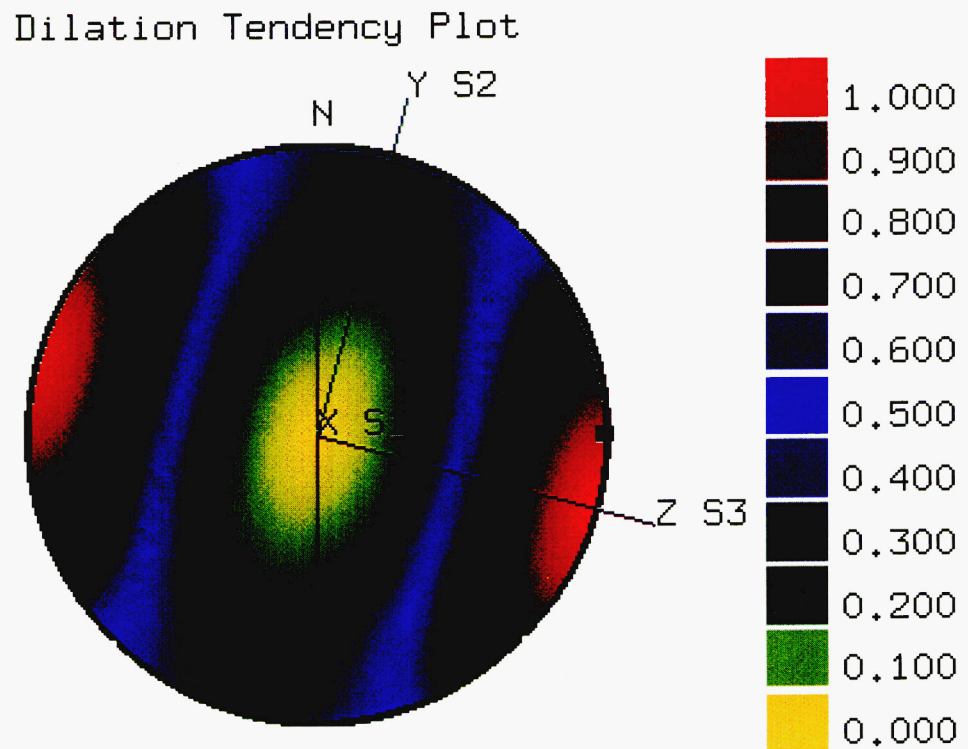
```
-----
```

```
File Name: tc4.vbl
```

```
-----
```

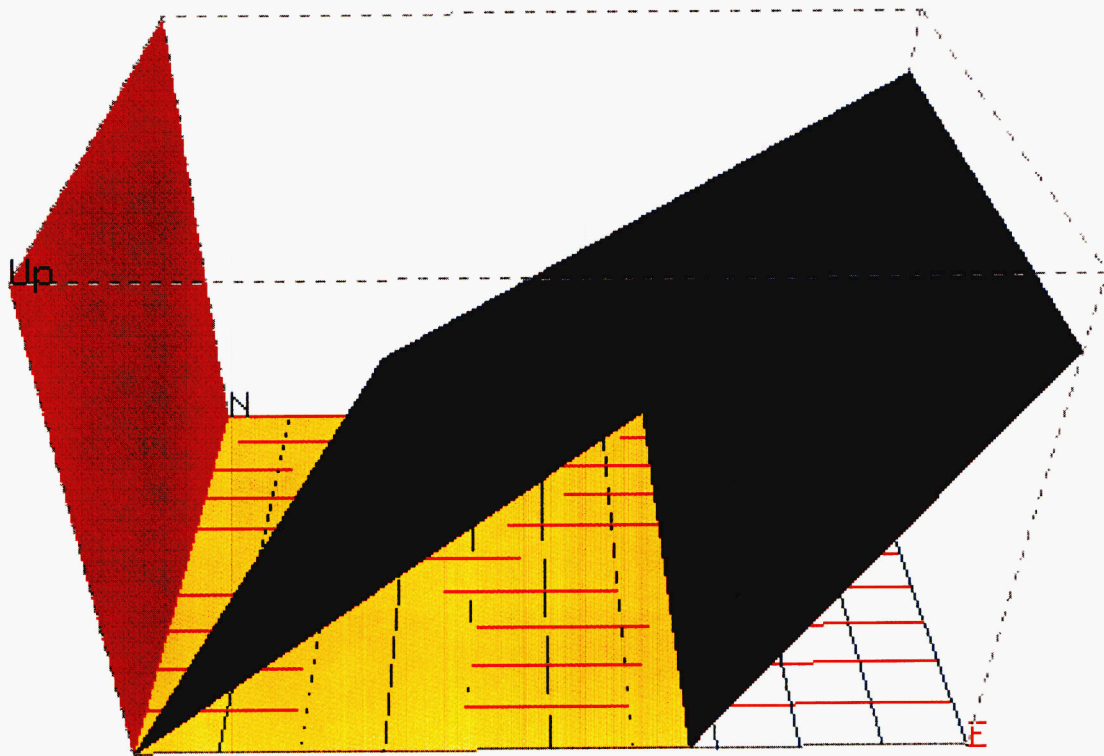
```
10.000000 0.000000 0.000000 0.710823 305.093628 54.915829
10.000000 10.000000 0.000000 NULL NULL NULL
15.000000 10.000000 8.700000 NULL NULL NULL
10.000000 0.000000 0.000000 0.710823 305.093628 54.915829
15.000000 10.000000 8.700000 NULL NULL NULL
15.000000 0.000000 8.700000 NULL NULL NULL
```

- h. Using the Options button, select the Compute Dilation Tendency button.
- i. Verify that the Tendency Plot viewer appears to be colored similar to the figure below.



j. Verify that the surfaces in the 3D viewer appear to be colored similar to the figure below.

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- k. Select the Options button on the 3D Fault Viewer window and select the Browse Data button. Verify that the values in the Browse Data window match the following values.

```
#Created by: @(#)3dstress 09-30-96 Rev 1.2
#Date: Mon Oct 7 16:58:46 1996
```

```
#Generated by: 3D Fault Viewer
```

	Mag	Dir	Plng
SX	40	15	90
SY	30	15	0
SZ	10	105	0

```
X-Y-Z-Dilation_Tendency
```

```
-----
```

```
File Name: /pscr0/brent2/dvrDir_961007/961003dir/tc1.vbl
```

```
-----
```

```
0.000000 0.000000 0.000000 0.000000
10.000000 0.000000 0.000000 NULL
10.000000 10.000000 0.000000 NULL
0.000000 0.000000 0.000000 0.000000
10.000000 10.000000 0.000000 NULL
0.000000 10.000000 0.000000 NULL
```

```
-----
```

```
File Name: /pscr0/brent2/dvrDir_961007/961003dir/tc2.vbl
```

```
-----
```

```
0.000000 0.000000 0.000000 0.955342
0.000000 10.000000 0.000000 NULL
0.000000 10.000000 10.000000 NULL
0.000000 0.000000 0.000000 0.955342
0.000000 10.000000 10.000000 NULL
0.000000 0.000000 10.000000 NULL
```

```
-----
```

```
File Name: /pscr0/brent2/dvrDir_961007/961003dir/tc3.vbl
```

```
-----
```

```
0.000000 0.000000 0.000000 0.715217
10.000000 10.000000 0.000000 NULL
15.000000 10.000000 8.700000 NULL
0.000000 0.000000 0.000000 0.715217
15.000000 10.000000 8.700000 NULL
5.000000 0.000000 8.700000 NULL
```

```
-----
```

```
File Name: /pscr0/brent2/dvrDir_961007/961003dir/tc4.vbl
```

```
-----
```

```
10.000000 0.000000 0.000000 0.718143
10.000000 10.000000 0.000000 NULL
15.000000 10.000000 8.700000 NULL
10.000000 0.000000 0.000000 0.718143
15.000000 10.000000 8.700000 NULL
15.000000 0.000000 8.700000 NULL
```

2.5 Display line coverage overlays in 2D viewer window.

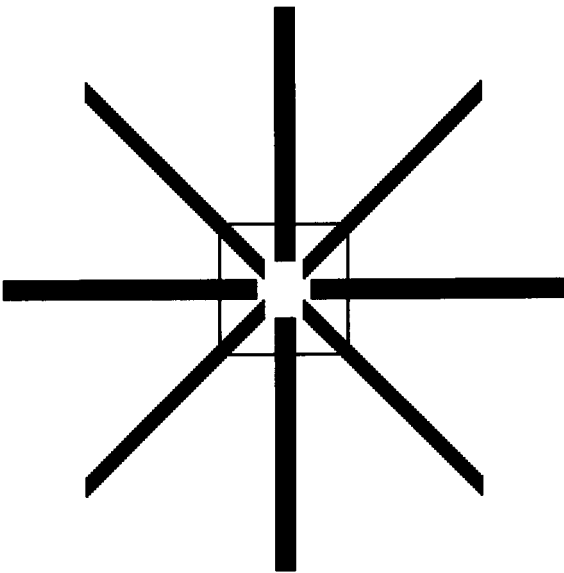
- Open the Map viewer window.
- Select the Coverages button on the Map viewer window.
- Select the Load button on the Coverage Tool dialog window.
- Use the file selector dialog window to select a line coverage file to load such as the test file below.

```

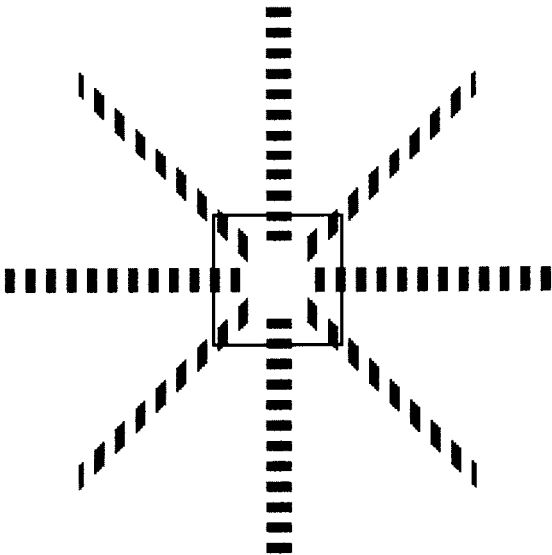
100
  0.00      50.00
  0.00     500.00
END
101
 35.36      35.36
353.55     353.55
END
102
 50.00      0.00
500.00      0.00
END
103
 35.36     -35.36
353.55    -353.55
END
104
  0.00     -50.00
  0.00    -500.00
END
105
-35.36     -35.36
-353.55    -353.55
END
106
-50.00      0.00
-500.00     0.00
END
107
-35.36      35.36
-353.55     353.55
END
END

```

e. Verify that the line coverage displays in the Map Viewer window.



f. Use the Coverage Tool buttons and sliders to modify the color, line style, and line width of the line coverage that is loaded.



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2.6 Display computed dilation tendency for a user specified fault surface orientation in the Tendency Plot viewer window.

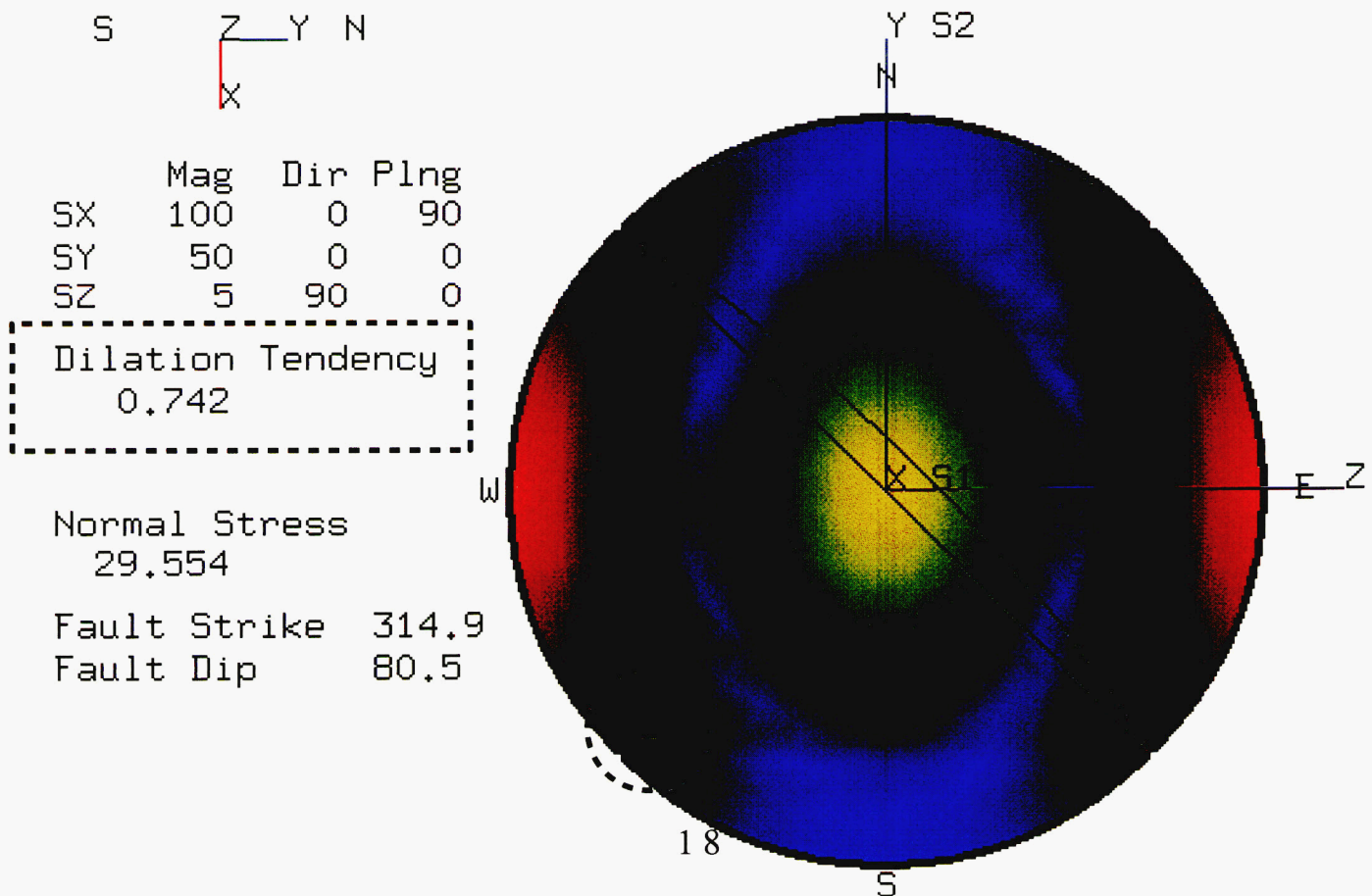
- Open the Tendency Plot, Sliders, and Options windows.
- Select the Compute Dilation Tendency button on the Options window.
- Set the stress magnitudes and orientations in the Sliders windows to the following values:

	Mag	Direction	Plunge
SX	100	0	90
SY	50	0	0
SZ	5	90	0

- Use the left mouse button to set the fault strike and dip in the Tendency Plot window to the following values and verify the dilation tendency display values as follows.

Fault Strike	Fault Dip	Dilation Value
45	30	0.20
135	60	0.57
215	20	0.10
315	80	0.74

Dilation Tendency Plot

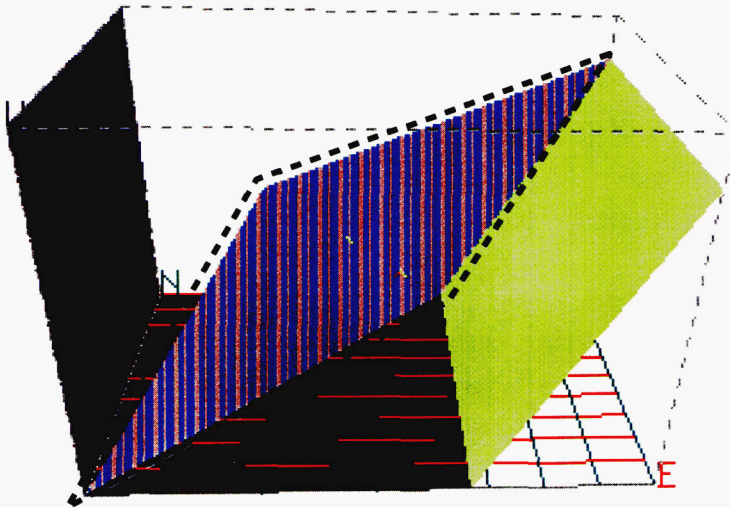


2.7 Highlight polygons of faults in 3D viewer that correspond to orientations selected in the Tendency Plot viewer.

- Open the 3D Fault viewer and Tendency Plot windows.
- Load the following VBL files in the 3D Fault viewer (tc1.vbl, tc2.vbl, tc3.vbl, tc4.vbl) see section 2.4 for a listing of the contents of these files.
- Use the middle mouse button in the Tendency Plot viewer window to set the fault strike and dip values to the following values and verify the highlighted polygons in the 3D Fault viewer window.

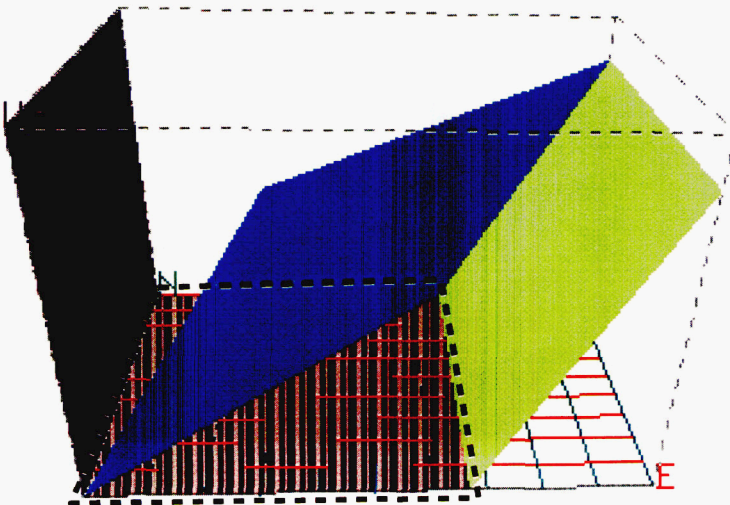
Fault strike 225

Fault dip 68



Fault strike 90

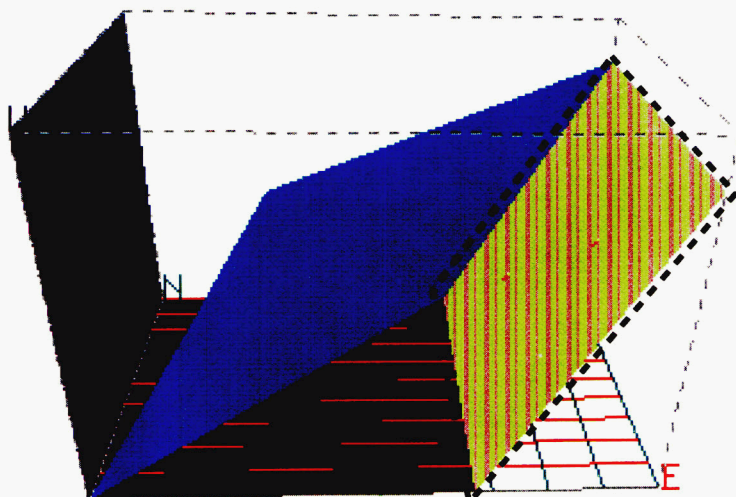
Fault dip 0



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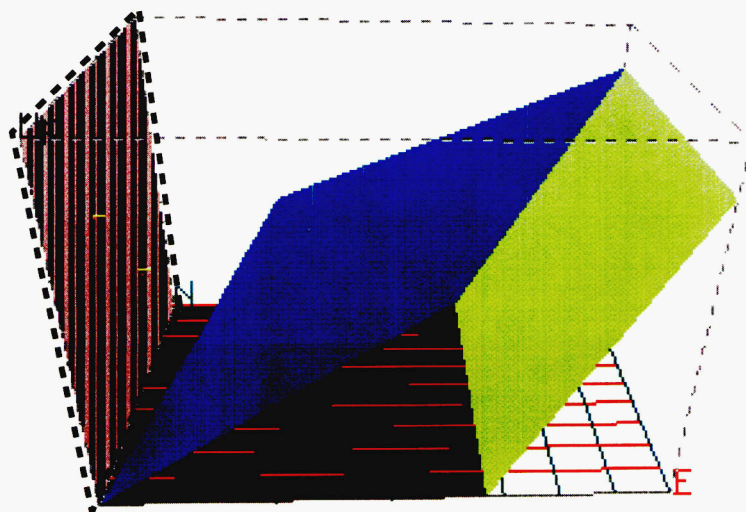
Fault strike 180

Fault dip 60



Fault strike 180

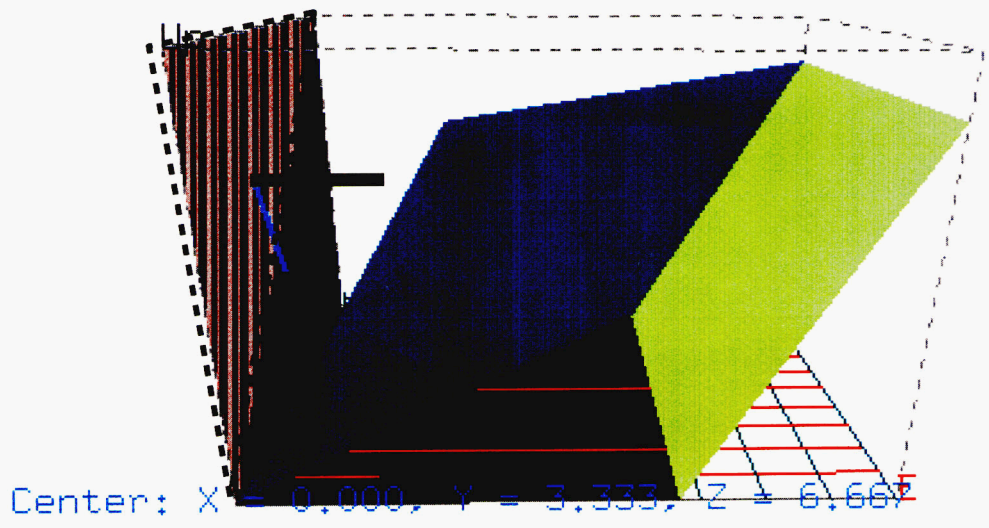
Fault dip 90



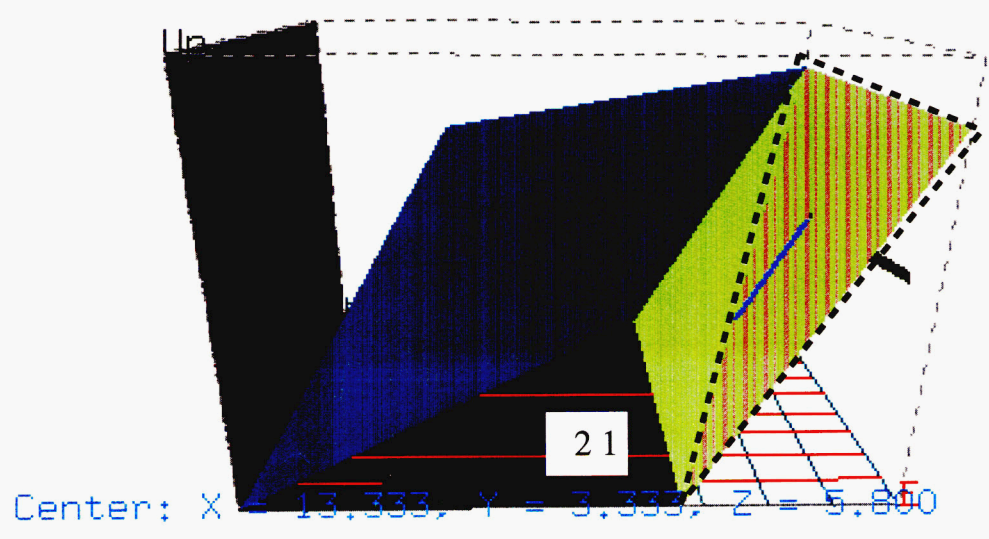
2.8 Display normal and slip direction vectors for selected polygons of faults in the 3D viewer.

- Open the 3D Fault viewer and Tendency Plot windows.
- Load the following VBL files in the 3D Fault viewer (tc1.vbl, tc2.vbl, tc3.vbl, tc4.vbl).
See section 2.4 for a listing of the contents of these files.
- Select the Options button on the 3D Fault viewer window and select the Select Mode On button.
- Pick the following triangles as shown below and verify that the fault strike and dip displayed in the Tendency Plot window match the following figures. The colors of the normal (black) and slip direction (cyan) vectors are controlled using the Options dialog from the 3D Fault viewer window.

Select Mode



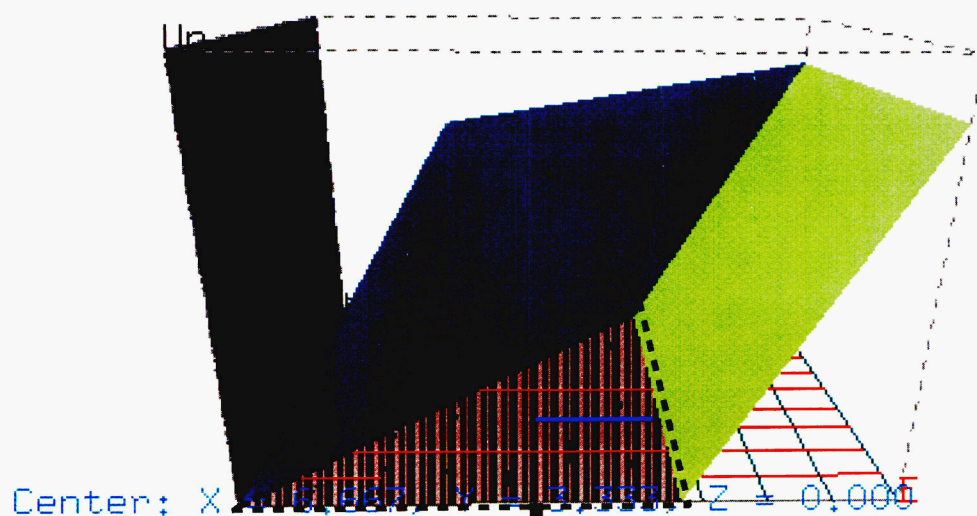
Select Mode



Fault strike 90

Fault dip 0

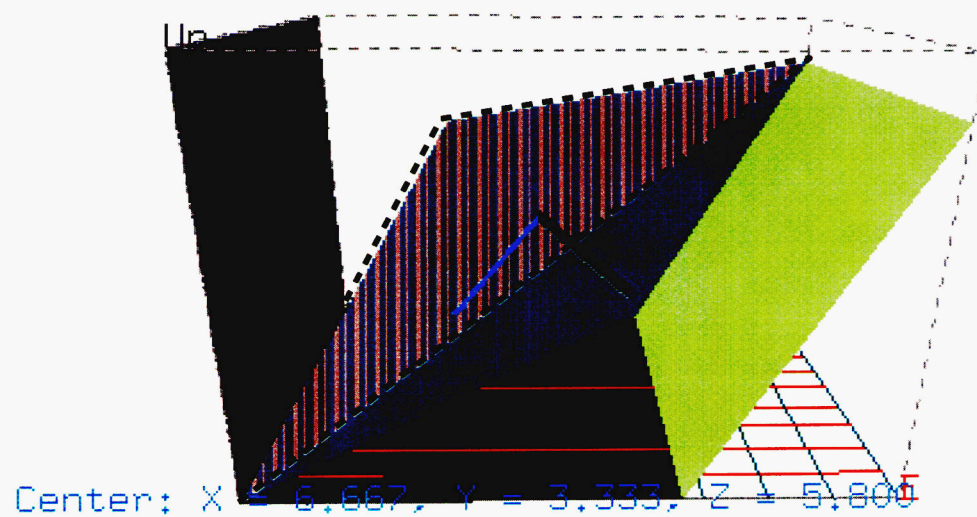
Select Mode



Fault strike 225

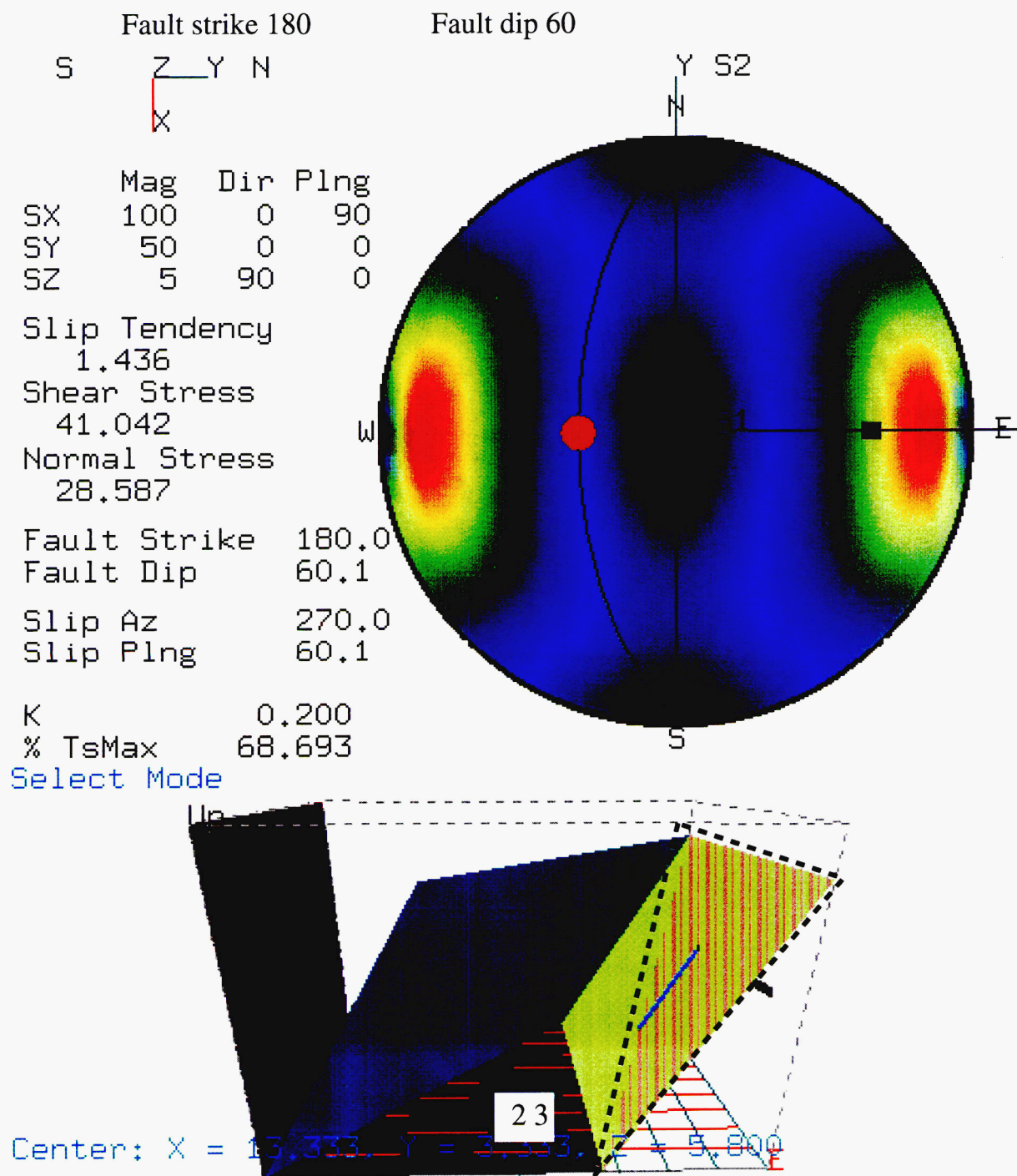
Fault dip 68

Select Mode



2.9 Display the fault surface orientation in the Tendency Plot viewer that corresponds to the orientation of a selected polygon of a fault in the 3D viewer.

- Open the 3D Fault viewer and Tendency Plot windows.
- Load the following VBL files in the 3D Fault viewer (tc1.vbl, tc2.vbl, tc3.vbl, tc4.vbl).
See section 2.4 for a listing of the contents of these files.
- Select the Options button on the 3D Fault viewer window and select the Select Mode On button.
- Pick the following triangles as shown below and verify that the fault strike and dip displayed in the Tendency Plot window match the following figures.



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Fault strike 180

Fault dip 90

	Mag	Dir	Plng
SX	100	0	90
SY	50	0	0
SZ	5	90	0

Slip Tendency

0.000

Shear Stress

0.000

Normal Stress

5.000

Fault Strike 180.0

Fault Dip 90.0

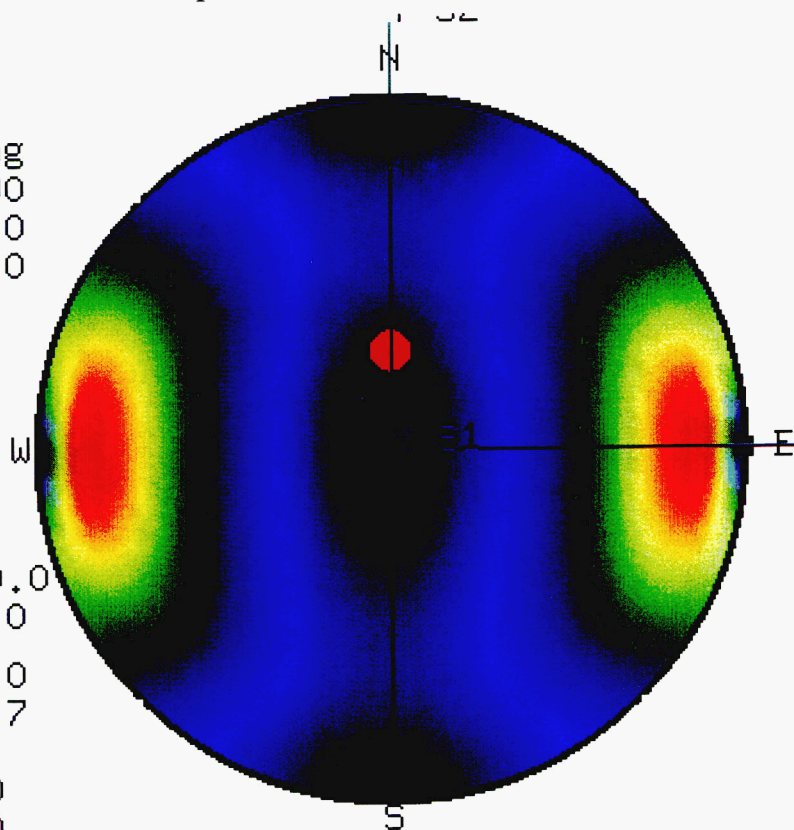
Slip Az 0.0

Slip Plng 64.7

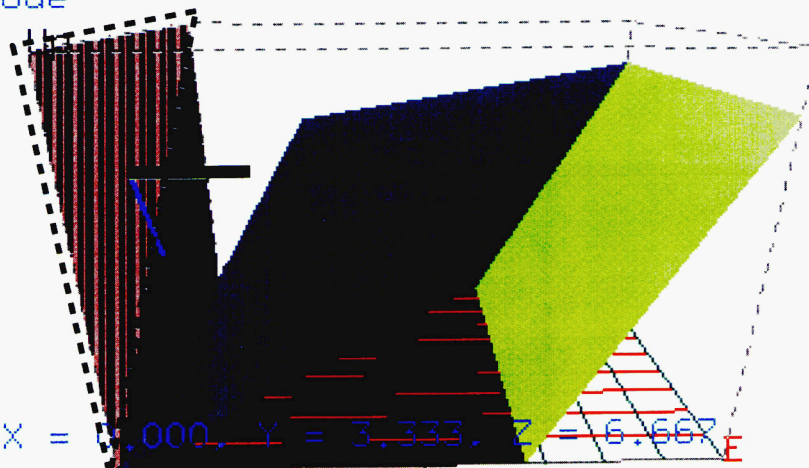
K 0.200

% TsMax 0.000

R 0.526



Select Mode



Center: X = 0.000, Y = 3.333, Z = 6.667

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Fault strike 90

Fault dip 0

	Mag	Dir	Plng
SX	100	0	90
SY	50	0	0
SZ	5	90	0

Slip Tendency
0.000

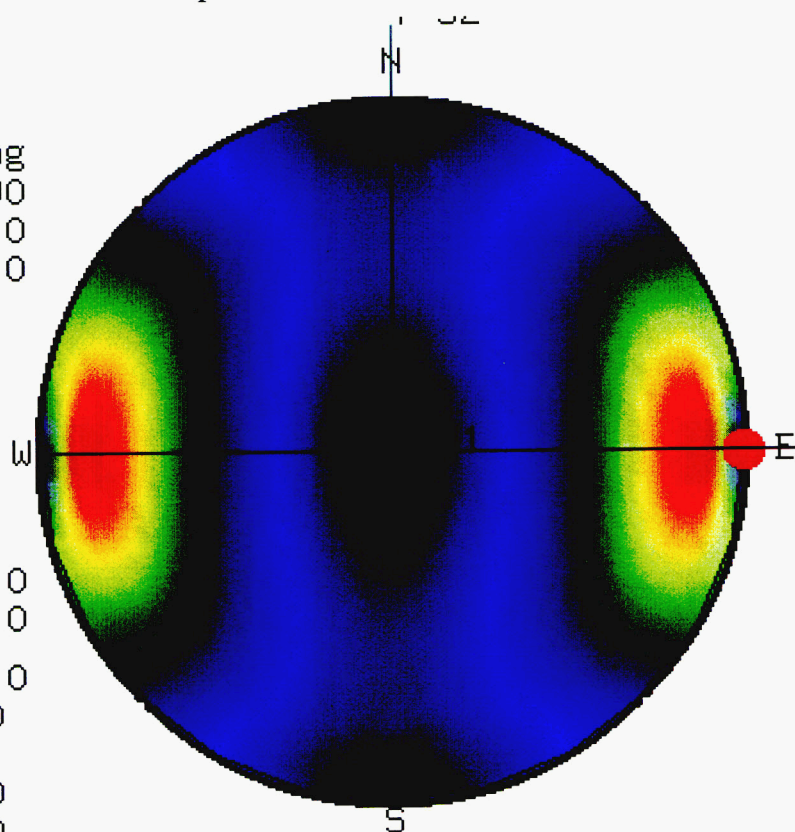
Shear Stress
0.000

Normal Stress
100.000

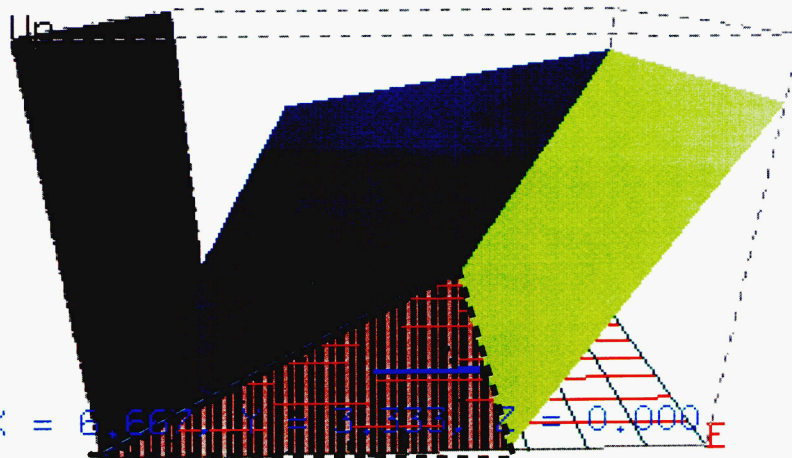
Fault Strike 90.0
Fault Dip 0.0

Slip Az 90.0
Slip Plng 0.0

K 0.200
% TsMax 0.000
R 0.526



Select Mode



Center: X = 6.662, Y = 3.533, Z = 0.000

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Fault strike 225

Fault dip 68

	Mag	Dir	Plog
SX	100	0	90
SY	50	0	0
SZ	5	90	0

Slip Tendency
0.867

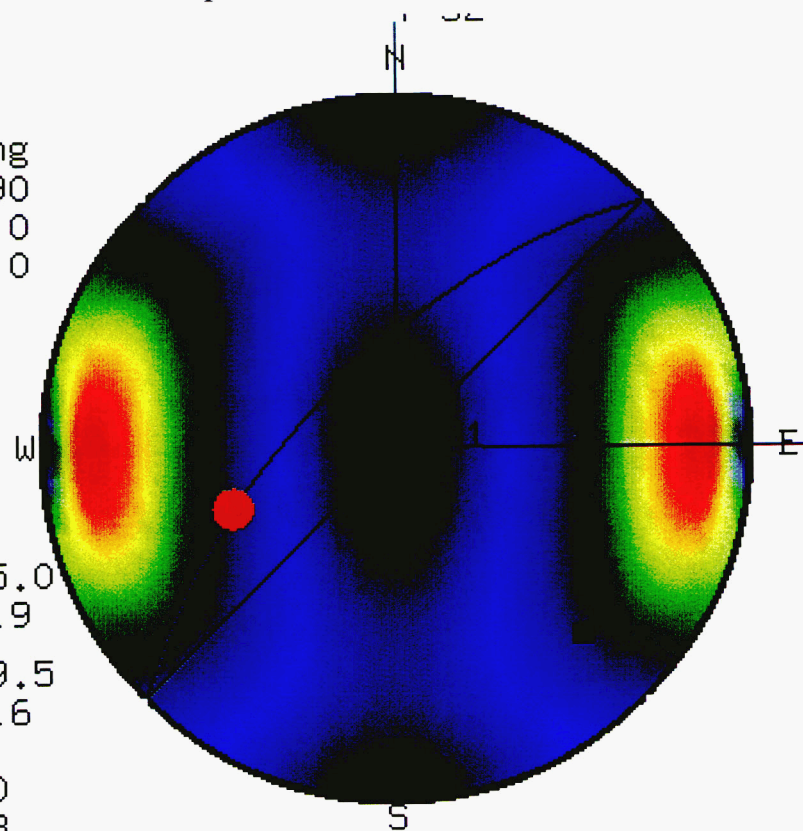
Shear Stress
32.771

Normal Stress
37.776

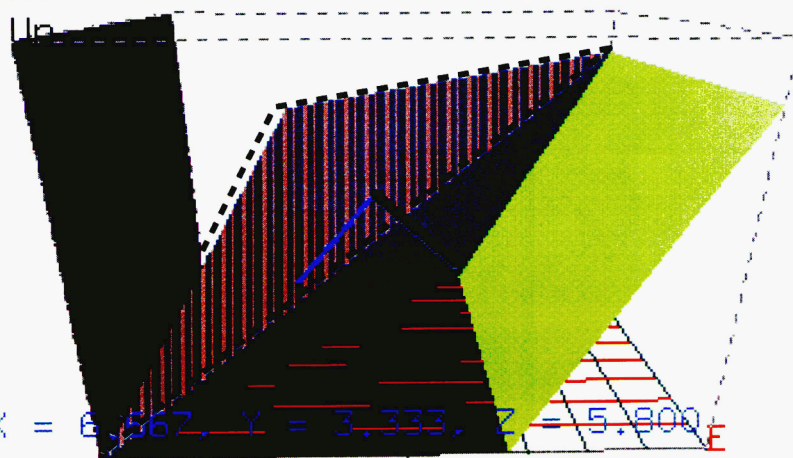
Fault Strike 225.0
Fault Dip 67.9

Slip Az 249.5
Slip Plog 45.6

K 0.200
% TsMax 41.508
R 0.526



Select Mode



Center: X = 6.567, Y = 3.333, Z = 5.800

3. Technical basis for slip and dilation tendency

The equations for computing slip and dilation tendency for a given fault surface using the input 3D stress conditions are given in the 3DStress users manual. The following test procedures are used to verify the correct computation of slip and dilation tendency values.

3.1 Slip tendency computations

a. Execute 3DStress using the command line options as shown in the example below.

```
% 3dstress -s sx sy sz rx ry rz fstrike fdip
```

```
% 3dstress -s 100 50 5 0 0 0 135 70
```

```
sxyz = 100 50 5 rxyz = 0 0 0 flt = 135 70 slip = 294.347 44.0995 sliptend = 0.874458
```

b. Execute 3DStress for the following cases on the next pages and verify the slip vector direction, slip vector plunge, and slip tendency values returned by 3DStress.

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```
# Program: 3dstress.exp:
# 3dstress 09-30-96 Rev 1.2
# Execution date: Tue Oct 8 16:39:48 CDT 1996
# sigmaX sigmaY sigmaZ   rotX rotY rotZ   fltStrike fltDip   slipAzimuth slipPlunge   slipTendency
S 1 50 50 R 0 0 0 F 0 45 SLIP_VECTOR 0 90 SLIPTEND 0.96
S 1 50 50 R 0 0 0 F 45 45 SLIP_VECTOR 0 135 SLIPTEND 0.96
S 1 50 50 R 0 0 45 F 0 45 SLIP_VECTOR 0 26 SLIPTEND 0.56
S 1 50 50 R 0 0 45 F 45 45 SLIP_VECTOR 0 56 SLIPTEND 1.52
S 1 50 50 R 0 45 0 F 0 45 SLIP_VECTOR 0 180 SLIPTEND 0.00
S 1 50 50 R 0 45 0 F 45 45 SLIP_VECTOR 0 213 SLIPTEND 1.52
S 1 50 50 R 0 45 45 F 0 45 SLIP_VECTOR 0 168 SLIPTEND 1.52
S 1 50 50 R 0 45 45 F 45 45 SLIP_VECTOR 0 95 SLIPTEND 2.66
S 1 50 50 R 45 0 0 F 0 45 SLIP_VECTOR 0 90 SLIPTEND 0.96
S 1 50 50 R 45 0 0 F 45 45 SLIP_VECTOR 0 135 SLIPTEND 0.96
S 1 50 50 R 45 0 45 F 0 45 SLIP_VECTOR 0 50 SLIPTEND 0.15
S 1 50 50 R 45 0 45 F 45 45 SLIP_VECTOR 0 71 SLIPTEND 0.56
S 1 50 50 R 45 45 0 F 0 45 SLIP_VECTOR 0 11 SLIPTEND 1.52
S 1 50 50 R 45 45 0 F 45 45 SLIP_VECTOR 0 225 SLIPTEND 0.00
S 1 50 50 R 45 45 45 F 0 45 SLIP_VECTOR 0 11 SLIPTEND 0.50
S 1 50 50 R 45 45 45 F 45 45 SLIP_VECTOR 0 213 SLIPTEND 1.52
S 1 50 99 R 0 0 0 F 0 45 SLIP_VECTOR 0 90 SLIPTEND 0.98
S 1 50 99 R 0 0 0 F 45 45 SLIP_VECTOR 0 101 SLIPTEND 1.08
S 1 50 99 R 0 0 45 F 0 45 SLIP_VECTOR 0 56 SLIPTEND 0.65
S 1 50 99 R 0 0 45 F 45 45 SLIP_VECTOR 0 63 SLIPTEND 1.60
S 1 50 99 R 0 45 0 F 0 45 SLIP_VECTOR 0 180 SLIPTEND 0.00
S 1 50 99 R 0 45 0 F 45 45 SLIP_VECTOR 0 225 SLIPTEND 1.60
S 1 50 99 R 0 45 45 F 0 45 SLIP_VECTOR 0 180 SLIPTEND 1.60
S 1 50 99 R 0 45 45 F 45 45 SLIP_VECTOR 0 80 SLIPTEND 3.00
S 1 50 99 R 45 0 0 F 0 45 SLIP_VECTOR 0 123 SLIPTEND 1.08
S 1 50 99 R 45 0 0 F 45 45 SLIP_VECTOR 0 135 SLIPTEND 0.98
S 1 50 99 R 45 0 45 F 0 45 SLIP_VECTOR 0 136 SLIPTEND 0.37
S 1 50 99 R 45 0 45 F 45 45 SLIP_VECTOR 0 101 SLIPTEND 0.65
S 1 50 99 R 45 45 0 F 0 45 SLIP_VECTOR 0 180 SLIPTEND 1.60
S 1 50 99 R 45 45 0 F 45 45 SLIP_VECTOR 0 225 SLIPTEND 0.00
S 1 50 99 R 45 45 45 F 0 45 SLIP_VECTOR 0 35 SLIPTEND 0.57
S 1 50 99 R 45 45 45 F 45 45 SLIP_VECTOR 0 225 SLIPTEND 1.60
S 1 99 50 R 0 0 0 F 0 45 SLIP_VECTOR 0 90 SLIPTEND 0.96
S 1 99 50 R 0 0 0 F 45 45 SLIP_VECTOR 0 168 SLIPTEND 1.08
S 1 99 50 R 0 0 45 F 0 45 SLIP_VECTOR 0 180 SLIPTEND 0.69
S 1 99 50 R 0 0 45 F 45 45 SLIP_VECTOR 0 225 SLIPTEND 1.60
S 1 99 50 R 0 45 0 F 0 45 SLIP_VECTOR 0 180 SLIPTEND 0.00
S 1 99 50 R 0 45 0 F 45 45 SLIP_VECTOR 0 206 SLIPTEND 1.60
S 1 99 50 R 0 45 45 F 0 45 SLIP_VECTOR 0 161 SLIPTEND 1.60
S 1 99 50 R 0 45 45 F 45 45 SLIP_VECTOR 0 120 SLIPTEND 2.94
S 1 99 50 R 45 0 0 F 0 45 SLIP_VECTOR 0 56 SLIPTEND 1.08
S 1 99 50 R 45 0 0 F 45 45 SLIP_VECTOR 0 135 SLIPTEND 0.96
S 1 99 50 R 45 0 45 F 0 45 SLIP_VECTOR 0 180 SLIPTEND 0.29
S 1 99 50 R 45 0 45 F 45 45 SLIP_VECTOR 0 225 SLIPTEND 0.69
S 1 99 50 R 45 45 0 F 0 45 SLIP_VECTOR 0 18 SLIPTEND 1.60
S 1 99 50 R 45 45 0 F 45 45 SLIP_VECTOR 0 225 SLIPTEND 0.00
S 1 99 50 R 45 45 45 F 0 45 SLIP_VECTOR 0 179 SLIPTEND 0.53
S 1 99 50 R 45 45 45 F 45 45 SLIP_VECTOR 0 206 SLIPTEND 1.60
S 1 99 99 R 0 0 0 F 0 45 SLIP_VECTOR 0 90 SLIPTEND 0.98
S 1 99 99 R 0 0 0 F 45 45 SLIP_VECTOR 0 135 SLIPTEND 0.98
S 1 99 99 R 0 0 45 F 0 45 SLIP_VECTOR 0 26 SLIPTEND 0.57
S 1 99 99 R 0 0 45 F 45 45 SLIP_VECTOR 0 56 SLIPTEND 1.58
S 1 99 99 R 0 45 0 F 0 45 SLIP_VECTOR 0 180 SLIPTEND 0.00
S 1 99 99 R 0 45 0 F 45 45 SLIP_VECTOR 0 213 SLIPTEND 1.58
S 1 99 99 R 0 45 45 F 0 45 SLIP_VECTOR 0 168 SLIPTEND 1.58
S 1 99 99 R 0 45 45 F 45 45 SLIP_VECTOR 0 95 SLIPTEND 2.95
S 1 99 99 R 45 0 0 F 0 45 SLIP_VECTOR 0 90 SLIPTEND 0.98
S 1 99 99 R 45 0 0 F 45 45 SLIP_VECTOR 0 135 SLIPTEND 0.98
S 1 99 99 R 45 0 45 F 0 45 SLIP_VECTOR 0 50 SLIPTEND 0.15
S 1 99 99 R 45 0 45 F 45 45 SLIP_VECTOR 0 71 SLIPTEND 0.57
S 1 99 99 R 45 45 0 F 0 45 SLIP_VECTOR 0 11 SLIPTEND 1.58
S 1 99 99 R 45 45 0 F 45 45 SLIP_VECTOR 0 225 SLIPTEND 0.00
S 1 99 99 R 45 45 45 F 0 45 SLIP_VECTOR 0 11 SLIPTEND 0.51
S 1 99 99 R 45 45 45 F 45 45 SLIP_VECTOR 0 213 SLIPTEND 1.58
```

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S	50	1	1	R	0	0	0	F	0	45	SLIP_VECTOR	0	90	SLIPTEND	0.96
S	50	1	1	R	0	0	0	F	45	45	SLIP_VECTOR	0	135	SLIPTEND	0.96
S	50	1	1	R	0	0	45	F	0	45	SLIP_VECTOR	0	26	SLIPTEND	1.60
S	50	1	1	R	0	0	45	F	45	45	SLIP_VECTOR	0	56	SLIPTEND	0.59
S	50	1	1	R	0	45	0	F	0	45	SLIP_VECTOR	0	0	SLIPTEND	0.00
S	50	1	1	R	0	45	0	F	45	45	SLIP_VECTOR	0	213	SLIPTEND	0.59
S	50	1	1	R	0	45	45	F	0	45	SLIP_VECTOR	0	168	SLIPTEND	0.59
S	50	1	1	R	0	45	45	F	45	45	SLIP_VECTOR	0	95	SLIPTEND	0.30
S	50	1	1	R	45	0	0	F	0	45	SLIP_VECTOR	0	90	SLIPTEND	0.96
S	50	1	1	R	45	0	0	F	45	45	SLIP_VECTOR	0	135	SLIPTEND	0.96
S	50	1	1	R	45	0	45	F	0	45	SLIP_VECTOR	0	50	SLIPTEND	3.46
S	50	1	1	R	45	0	45	F	45	45	SLIP_VECTOR	0	71	SLIPTEND	1.60
S	50	1	1	R	45	45	0	F	0	45	SLIP_VECTOR	0	11	SLIPTEND	0.59
S	50	1	1	R	45	45	0	F	45	45	SLIP_VECTOR	0	225	SLIPTEND	0.00
S	50	1	1	R	45	45	45	F	0	45	SLIP_VECTOR	0	11	SLIPTEND	1.77
S	50	1	1	R	45	45	45	F	45	45	SLIP_VECTOR	0	213	SLIPTEND	0.59
S	50	1	99	R	0	0	0	F	0	45	SLIP_VECTOR	0	90	SLIPTEND	0.33
S	50	1	99	R	0	0	0	F	45	45	SLIP_VECTOR	0	225	SLIPTEND	0.69
S	50	1	99	R	0	0	45	F	0	45	SLIP_VECTOR	0	123	SLIPTEND	0.65
S	50	1	99	R	0	0	45	F	45	45	SLIP_VECTOR	0	88	SLIPTEND	0.37
S	50	1	99	R	0	45	0	F	0	45	SLIP_VECTOR	0	0	SLIPTEND	0.00
S	50	1	99	R	0	45	0	F	45	45	SLIP_VECTOR	0	181	SLIPTEND	0.59
S	50	1	99	R	0	45	45	F	0	45	SLIP_VECTOR	0	136	SLIPTEND	0.59
S	50	1	99	R	0	45	45	F	45	45	SLIP_VECTOR	0	223	SLIPTEND	0.27
S	50	1	99	R	45	0	0	F	0	45	SLIP_VECTOR	0	0	SLIPTEND	0.69
S	50	1	99	R	45	0	0	F	45	45	SLIP_VECTOR	0	135	SLIPTEND	0.33
S	50	1	99	R	45	0	45	F	0	45	SLIP_VECTOR	0	161	SLIPTEND	1.60
S	50	1	99	R	45	0	45	F	45	45	SLIP_VECTOR	0	168	SLIPTEND	0.65
S	50	1	99	R	45	45	0	F	0	45	SLIP_VECTOR	0	43	SLIPTEND	0.59
S	50	1	99	R	45	45	0	F	45	45	SLIP_VECTOR	0	45	SLIPTEND	0.00
S	50	1	99	R	45	45	45	F	0	45	SLIP_VECTOR	0	150	SLIPTEND	1.66
S	50	1	99	R	45	45	45	F	45	45	SLIP_VECTOR	0	181	SLIPTEND	0.59
S	50	99	1	R	0	0	0	F	0	45	SLIP_VECTOR	0	90	SLIPTEND	0.96
S	50	99	1	R	0	0	0	F	45	45	SLIP_VECTOR	0	45	SLIPTEND	0.69
S	50	99	1	R	0	0	45	F	0	45	SLIP_VECTOR	0	123	SLIPTEND	1.08
S	50	99	1	R	0	0	45	F	45	45	SLIP_VECTOR	0	88	SLIPTEND	0.59
S	50	99	1	R	0	45	0	F	0	45	SLIP_VECTOR	0	180	SLIPTEND	0.00
S	50	99	1	R	0	45	0	F	45	45	SLIP_VECTOR	0	181	SLIPTEND	0.37
S	50	99	1	R	0	45	45	F	0	45	SLIP_VECTOR	0	136	SLIPTEND	0.37
S	50	99	1	R	0	45	45	F	45	45	SLIP_VECTOR	0	223	SLIPTEND	0.29
S	50	99	1	R	45	0	0	F	0	45	SLIP_VECTOR	0	180	SLIPTEND	0.69
S	50	99	1	R	45	0	0	F	45	45	SLIP_VECTOR	0	135	SLIPTEND	0.96
S	50	99	1	R	45	0	45	F	0	45	SLIP_VECTOR	0	161	SLIPTEND	0.58
S	50	99	1	R	45	0	45	F	45	45	SLIP_VECTOR	0	168	SLIPTEND	1.08
S	50	99	1	R	45	45	0	F	0	45	SLIP_VECTOR	0	43	SLIPTEND	0.37
S	50	99	1	R	45	45	0	F	45	45	SLIP_VECTOR	0	45	SLIPTEND	0.00
S	50	99	1	R	45	45	45	F	0	45	SLIP_VECTOR	0	150	SLIPTEND	0.35
S	50	99	1	R	45	45	45	F	45	45	SLIP_VECTOR	0	181	SLIPTEND	0.37
S	50	99	99	R	0	0	0	F	0	45	SLIP_VECTOR	0	90	SLIPTEND	0.33
S	50	99	99	R	0	0	0	F	45	45	SLIP_VECTOR	0	135	SLIPTEND	0.33
S	50	99	99	R	0	0	45	F	0	45	SLIP_VECTOR	0	26	SLIPTEND	0.24
S	50	99	99	R	0	0	45	F	45	45	SLIP_VECTOR	0	56	SLIPTEND	0.34
S	50	99	99	R	0	45	0	F	0	45	SLIP_VECTOR	0	180	SLIPTEND	0.00
S	50	99	99	R	0	45	0	F	45	45	SLIP_VECTOR	0	213	SLIPTEND	0.34
S	50	99	99	R	0	45	45	F	0	45	SLIP_VECTOR	0	168	SLIPTEND	0.34
S	50	99	99	R	0	45	45	F	45	45	SLIP_VECTOR	0	95	SLIPTEND	0.25
S	50	99	99	R	45	0	0	F	0	45	SLIP_VECTOR	0	90	SLIPTEND	0.33
S	50	99	99	R	45	0	0	F	45	45	SLIP_VECTOR	0	135	SLIPTEND	0.33
S	50	99	99	R	45	0	45	F	0	45	SLIP_VECTOR	0	50	SLIPTEND	0.07
S	50	99	99	R	45	0	45	F	45	45	SLIP_VECTOR	0	71	SLIPTEND	0.24
S	50	99	99	R	45	45	0	F	0	45	SLIP_VECTOR	0	11	SLIPTEND	0.34
S	50	99	99	R	45	45	0	F	45	45	SLIP_VECTOR	0	225	SLIPTEND	0.00
S	50	99	99	R	45	45	45	F	0	45	SLIP_VECTOR	0	11	SLIPTEND	0.22
S	50	99	99	R	45	45	45	F	45	45	SLIP_VECTOR	0	213	SLIPTEND	0.34

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S 99 1 1 R 0 0 0 F 0 45	SLIP_VECTOR 0 90	SLIPTEND 0.98
S 99 1 1 R 0 0 0 F 45 45	SLIP_VECTOR 0 135	SLIPTEND 0.98
S 99 1 1 R 0 0 45 F 0 45	SLIP_VECTOR 0 26	SLIPTEND 1.66
S 99 1 1 R 0 0 45 F 45 45	SLIP_VECTOR 0 56	SLIPTEND 0.60
S 99 1 1 R 0 45 0 F 0 45	SLIP_VECTOR 0 0	SLIPTEND 0.00
S 99 1 1 R 0 45 0 F 45 45	SLIP_VECTOR 0 213	SLIPTEND 0.60
S 99 1 1 R 0 45 45 F 0 45	SLIP_VECTOR 0 168	SLIPTEND 0.60
S 99 1 1 R 0 45 45 F 45 45	SLIP_VECTOR 0 95	SLIPTEND 0.30
S 99 1 1 R 45 0 0 F 0 45	SLIP_VECTOR 0 90	SLIPTEND 0.98
S 99 1 1 R 45 0 0 F 45 45	SLIP_VECTOR 0 135	SLIPTEND 0.98
S 99 1 1 R 45 0 45 F 0 45	SLIP_VECTOR 0 50	SLIPTEND 4.58
S 99 1 1 R 45 0 45 F 45 45	SLIP_VECTOR 0 71	SLIPTEND 1.66
S 99 1 1 R 45 45 0 F 0 45	SLIP_VECTOR 0 11	SLIPTEND 0.60
S 99 1 1 R 45 45 0 F 45 45	SLIP_VECTOR 0 225	SLIPTEND 0.00
S 99 1 1 R 45 45 45 F 0 45	SLIP_VECTOR 0 11	SLIPTEND 1.86
S 99 1 1 R 45 45 45 F 45 45	SLIP_VECTOR 0 213	SLIPTEND 0.60
S 99 1 50 R 0 0 0 F 0 45	SLIP_VECTOR 0 90	SLIPTEND 0.33
S 99 1 50 R 0 0 0 F 45 45	SLIP_VECTOR 0 168	SLIPTEND 0.65
S 99 1 50 R 0 0 45 F 0 45	SLIP_VECTOR 0 180	SLIPTEND 0.69
S 99 1 50 R 0 0 45 F 45 45	SLIP_VECTOR 0 45	SLIPTEND 0.29
S 99 1 50 R 0 45 0 F 0 45	SLIP_VECTOR 0 0	SLIPTEND 0.00
S 99 1 50 R 0 45 0 F 45 45	SLIP_VECTOR 0 206	SLIPTEND 0.58
S 99 1 50 R 0 45 45 F 0 45	SLIP_VECTOR 0 161	SLIPTEND 0.58
S 99 1 50 R 0 45 45 F 45 45	SLIP_VECTOR 0 120	SLIPTEND 0.19
S 99 1 50 R 45 0 0 F 0 45	SLIP_VECTOR 0 56	SLIPTEND 0.65
S 99 1 50 R 45 0 0 F 45 45	SLIP_VECTOR 0 135	SLIPTEND 0.33
S 99 1 50 R 45 0 45 F 0 45	SLIP_VECTOR 0 360	SLIPTEND 1.60
S 99 1 50 R 45 0 45 F 45 45	SLIP_VECTOR 0 225	SLIPTEND 0.69
S 99 1 50 R 45 45 0 F 0 45	SLIP_VECTOR 0 18	SLIPTEND 0.58
S 99 1 50 R 45 45 0 F 45 45	SLIP_VECTOR 0 225	SLIPTEND 0.00
S 99 1 50 R 45 45 45 F 0 45	SLIP_VECTOR 0 179	SLIPTEND 1.63
S 99 1 50 R 45 45 45 F 45 45	SLIP_VECTOR 0 206	SLIPTEND 0.58
S 99 50 1 R 0 0 0 F 0 45	SLIP_VECTOR 0 90	SLIPTEND 0.98
S 99 50 1 R 0 0 0 F 45 45	SLIP_VECTOR 0 101	SLIPTEND 0.65
S 99 50 1 R 0 0 45 F 0 45	SLIP_VECTOR 0 56	SLIPTEND 1.08
S 99 50 1 R 0 0 45 F 45 45	SLIP_VECTOR 0 63	SLIPTEND 0.58
S 99 50 1 R 0 45 0 F 0 45	SLIP_VECTOR 0 0	SLIPTEND 0.00
S 99 50 1 R 0 45 0 F 45 45	SLIP_VECTOR 0 225	SLIPTEND 0.29
S 99 50 1 R 0 45 45 F 0 45	SLIP_VECTOR 0 360	SLIPTEND 0.29
S 99 50 1 R 0 45 45 F 45 45	SLIP_VECTOR 0 80	SLIPTEND 0.27
S 99 50 1 R 45 0 0 F 0 45	SLIP_VECTOR 0 123	SLIPTEND 0.65
S 99 50 1 R 45 0 0 F 45 45	SLIP_VECTOR 0 135	SLIPTEND 0.98
S 99 50 1 R 45 0 45 F 0 45	SLIP_VECTOR 0 136	SLIPTEND 0.59
S 99 50 1 R 45 0 45 F 45 45	SLIP_VECTOR 0 101	SLIPTEND 1.08
S 99 50 1 R 45 45 0 F 0 45	SLIP_VECTOR 0 360	SLIPTEND 0.29
S 99 50 1 R 45 45 0 F 45 45	SLIP_VECTOR 0 225	SLIPTEND 0.00
S 99 50 1 R 45 45 45 F 0 45	SLIP_VECTOR 0 35	SLIPTEND 0.43
S 99 50 1 R 45 45 45 F 45 45	SLIP_VECTOR 0 45	SLIPTEND 0.29
S 99 50 50 R 0 0 0 F 0 45	SLIP_VECTOR 0 90	SLIPTEND 0.33
S 99 50 50 R 0 0 0 F 45 45	SLIP_VECTOR 0 135	SLIPTEND 0.33
S 99 50 50 R 0 0 45 F 0 45	SLIP_VECTOR 0 26	SLIPTEND 0.34
S 99 50 50 R 0 0 45 F 45 45	SLIP_VECTOR 0 56	SLIPTEND 0.25
S 99 50 50 R 0 45 0 F 0 45	SLIP_VECTOR 0 0	SLIPTEND 0.00
S 99 50 50 R 0 45 0 F 45 45	SLIP_VECTOR 0 213	SLIPTEND 0.25
S 99 50 50 R 0 45 45 F 0 45	SLIP_VECTOR 0 168	SLIPTEND 0.25
S 99 50 50 R 0 45 45 F 45 45	SLIP_VECTOR 0 95	SLIPTEND 0.14
S 99 50 50 R 45 0 0 F 0 45	SLIP_VECTOR 0 90	SLIPTEND 0.33
S 99 50 50 R 45 0 0 F 45 45	SLIP_VECTOR 0 135	SLIPTEND 0.33
S 99 50 50 R 45 0 45 F 0 45	SLIP_VECTOR 0 50	SLIPTEND 0.14
S 99 50 50 R 45 0 45 F 45 45	SLIP_VECTOR 0 71	SLIPTEND 0.34
S 99 50 50 R 45 45 0 F 0 45	SLIP_VECTOR 0 11	SLIPTEND 0.25
S 99 50 50 R 45 45 0 F 45 45	SLIP_VECTOR 0 225	SLIPTEND 0.00
S 99 50 50 R 45 45 45 F 0 45	SLIP_VECTOR 0 11	SLIPTEND 0.33
S 99 50 50 R 45 45 45 F 45 45	SLIP_VECTOR 0 213	SLIPTEND 0.25

3.2 Dilation tendency computations

- a. Execute 3DStress using the command line options as shown in the example below.

```
% 3dstress -d  sx sy sz  rx ry rz  fstrike fdip
```

```
% 3dstress -d  100 50 5  0 0 0  135 70
```

```
sxyz = 100 50 5  rxyz = 0 0 0  flt = 135 70  diltend = 0.673885
```

- b. Execute 3DStress for the following cases on the next pages and verify the dilation tendency values returned by 3DStress.

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```

# Program: 3dstress.exp:
# 3dstress 09-30-96 Rev 1.2
# Execution date: Tue Oct 8 16:40:05 CDT 1996
# sigmaX sigmaY sigmaZ   rotX rotY rotZ   fltStrike fltDip   dilationTend
S 1 50 50 R 0 0 0 F 0 45 DILTEND 0.50
S 1 50 50 R 0 0 0 F 45 45 DILTEND 0.50
S 1 50 50 R 0 0 45 F 0 45 DILTEND 0.25
S 1 50 50 R 0 0 45 F 45 45 DILTEND 0.73
S 1 50 50 R 0 45 0 F 0 45 DILTEND 1.00
S 1 50 50 R 0 45 0 F 45 45 DILTEND 0.73
S 1 50 50 R 0 45 45 F 0 45 DILTEND 0.73
S 1 50 50 R 0 45 45 F 45 45 DILTEND 0.92
S 1 50 50 R 45 0 0 F 0 45 DILTEND 0.50
S 1 50 50 R 45 0 0 F 45 45 DILTEND 0.50
S 1 50 50 R 45 0 45 F 0 45 DILTEND 0.02
S 1 50 50 R 45 0 45 F 45 45 DILTEND 0.25
S 1 50 50 R 45 45 0 F 0 45 DILTEND 0.73
S 1 50 50 R 45 45 0 F 45 45 DILTEND 1.00
S 1 50 50 R 45 45 45 F 0 45 DILTEND 0.21
S 1 50 50 R 45 45 45 F 45 45 DILTEND 0.73
S 1 50 99 R 0 0 0 F 0 45 DILTEND 0.50
S 1 50 99 R 0 0 0 F 45 45 DILTEND 0.62
S 1 50 99 R 0 0 45 F 0 45 DILTEND 0.38
S 1 50 99 R 0 0 45 F 45 45 DILTEND 0.74
S 1 50 99 R 0 45 0 F 0 45 DILTEND 1.00
S 1 50 99 R 0 45 0 F 45 45 DILTEND 0.85
S 1 50 99 R 0 45 45 F 0 45 DILTEND 0.85
S 1 50 99 R 0 45 45 F 45 45 DILTEND 0.93
S 1 50 99 R 45 0 0 F 0 45 DILTEND 0.62
S 1 50 99 R 45 0 0 F 45 45 DILTEND 0.50
S 1 50 99 R 45 0 45 F 0 45 DILTEND 0.39
S 1 50 99 R 45 0 45 F 45 45 DILTEND 0.38
S 1 50 99 R 45 45 0 F 0 45 DILTEND 0.85
S 1 50 99 R 45 45 0 F 45 45 DILTEND 1.00
S 1 50 99 R 45 45 45 F 0 45 DILTEND 0.57
S 1 50 99 R 45 45 45 F 45 45 DILTEND 0.85
S 1 99 50 R 0 0 0 F 0 45 DILTEND 0.75
S 1 99 50 R 0 0 0 F 45 45 DILTEND 0.62
S 1 99 50 R 0 0 45 F 0 45 DILTEND 0.50
S 1 99 50 R 0 0 45 F 45 45 DILTEND 0.85
S 1 99 50 R 0 45 0 F 0 45 DILTEND 1.00
S 1 99 50 R 0 45 0 F 45 45 DILTEND 0.74
S 1 99 50 R 0 45 45 F 0 45 DILTEND 0.74
S 1 99 50 R 0 45 45 F 45 45 DILTEND 0.95
S 1 99 50 R 45 0 0 F 0 45 DILTEND 0.62
S 1 99 50 R 45 0 0 F 45 45 DILTEND 0.75
S 1 99 50 R 45 0 45 F 0 45 DILTEND 0.15
S 1 99 50 R 45 0 45 F 45 45 DILTEND 0.50
S 1 99 50 R 45 45 0 F 0 45 DILTEND 0.74
S 1 99 50 R 45 45 0 F 45 45 DILTEND 1.00
S 1 99 50 R 45 45 45 F 0 45 DILTEND 0.24
S 1 99 50 R 45 45 45 F 45 45 DILTEND 0.74
S 1 99 99 R 0 0 0 F 0 45 DILTEND 0.50
S 1 99 99 R 0 0 0 F 45 45 DILTEND 0.50
S 1 99 99 R 0 0 45 F 0 45 DILTEND 0.25
S 1 99 99 R 0 0 45 F 45 45 DILTEND 0.73
S 1 99 99 R 0 45 0 F 0 45 DILTEND 1.00
S 1 99 99 R 0 45 0 F 45 45 DILTEND 0.73
S 1 99 99 R 0 45 45 F 0 45 DILTEND 0.73
S 1 99 99 R 0 45 45 F 45 45 DILTEND 0.92
S 1 99 99 R 45 0 0 F 0 45 DILTEND 0.50
S 1 99 99 R 45 0 0 F 45 45 DILTEND 0.50
S 1 99 99 R 45 0 45 F 0 45 DILTEND 0.02
S 1 99 99 R 45 0 45 F 45 45 DILTEND 0.25
S 1 99 99 R 45 45 0 F 0 45 DILTEND 0.73
S 1 99 99 R 45 45 0 F 45 45 DILTEND 1.00
S 1 99 99 R 45 45 45 F 0 45 DILTEND 0.21
S 1 99 99 R 45 45 45 F 45 45 DILTEND 0.73

```

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S	50	1	1	R	0	0	0	F	0	45	DILTEND	0.50
S	50	1	1	R	0	0	0	F	45	45	DILTEND	0.50
S	50	1	1	R	0	0	45	F	0	45	DILTEND	0.75
S	50	1	1	R	0	0	45	F	45	45	DILTEND	0.27
S	50	1	1	R	0	45	0	F	0	45	DILTEND	0.00
S	50	1	1	R	0	45	0	F	45	45	DILTEND	0.27
S	50	1	1	R	0	45	45	F	0	45	DILTEND	0.27
S	50	1	1	R	0	45	45	F	45	45	DILTEND	0.08
S	50	1	1	R	45	0	0	F	0	45	DILTEND	0.50
S	50	1	1	R	45	0	0	F	45	45	DILTEND	0.50
S	50	1	1	R	45	0	45	F	0	45	DILTEND	0.98
S	50	1	1	R	45	0	45	F	45	45	DILTEND	0.75
S	50	1	1	R	45	45	0	F	0	45	DILTEND	0.27
S	50	1	1	R	45	45	0	F	45	45	DILTEND	0.00
S	50	1	1	R	45	45	45	F	0	45	DILTEND	0.79
S	50	1	1	R	45	45	45	F	45	45	DILTEND	0.27
S	50	1	99	R	0	0	0	F	0	45	DILTEND	0.25
S	50	1	99	R	0	0	0	F	45	45	DILTEND	0.50
S	50	1	99	R	0	0	45	F	0	45	DILTEND	0.38
S	50	1	99	R	0	0	45	F	45	45	DILTEND	0.39
S	50	1	99	R	0	45	0	F	0	45	DILTEND	0.50
S	50	1	99	R	0	45	0	F	45	45	DILTEND	0.61
S	50	1	99	R	0	45	45	F	0	45	DILTEND	0.61
S	50	1	99	R	0	45	45	F	45	45	DILTEND	0.48
S	50	1	99	R	45	0	0	F	0	45	DILTEND	0.50
S	50	1	99	R	45	0	0	F	45	45	DILTEND	0.25
S	50	1	99	R	45	0	45	F	0	45	DILTEND	0.74
S	50	1	99	R	45	0	45	F	45	45	DILTEND	0.38
S	50	1	99	R	45	45	0	F	0	45	DILTEND	0.61
S	50	1	99	R	45	45	0	F	45	45	DILTEND	0.50
S	50	1	99	R	45	45	45	F	0	45	DILTEND	0.83
S	50	1	99	R	45	45	45	F	45	45	DILTEND	0.61
S	50	99	1	R	0	0	0	F	0	45	DILTEND	0.75
S	50	99	1	R	0	0	0	F	45	45	DILTEND	0.50
S	50	99	1	R	0	0	45	F	0	45	DILTEND	0.62
S	50	99	1	R	0	0	45	F	45	45	DILTEND	0.61
S	50	99	1	R	0	45	0	F	0	45	DILTEND	0.50
S	50	99	1	R	0	45	0	F	45	45	DILTEND	0.39
S	50	99	1	R	0	45	45	F	0	45	DILTEND	0.39
S	50	99	1	R	0	45	45	F	45	45	DILTEND	0.52
S	50	99	1	R	45	0	0	F	0	45	DILTEND	0.50
S	50	99	1	R	45	0	0	F	45	45	DILTEND	0.75
S	50	99	1	R	45	0	45	F	0	45	DILTEND	0.26
S	50	99	1	R	45	0	45	F	45	45	DILTEND	0.62
S	50	99	1	R	45	45	0	F	0	45	DILTEND	0.39
S	50	99	1	R	45	45	0	F	45	45	DILTEND	0.50
S	50	99	1	R	45	45	45	F	0	45	DILTEND	0.17
S	50	99	1	R	45	45	45	F	45	45	DILTEND	0.39
S	50	99	99	R	0	0	0	F	0	45	DILTEND	0.50
S	50	99	99	R	0	0	0	F	45	45	DILTEND	0.50
S	50	99	99	R	0	0	45	F	0	45	DILTEND	0.25
S	50	99	99	R	0	0	45	F	45	45	DILTEND	0.73
S	50	99	99	R	0	45	0	F	0	45	DILTEND	1.00
S	50	99	99	R	0	45	0	F	45	45	DILTEND	0.73
S	50	99	99	R	0	45	45	F	0	45	DILTEND	0.73
S	50	99	99	R	0	45	45	F	45	45	DILTEND	0.92
S	50	99	99	R	45	0	0	F	0	45	DILTEND	0.50
S	50	99	99	R	45	0	0	F	45	45	DILTEND	0.50
S	50	99	99	R	45	0	45	F	0	45	DILTEND	0.02
S	50	99	99	R	45	0	45	F	45	45	DILTEND	0.25
S	50	99	99	R	45	45	0	F	0	45	DILTEND	0.73
S	50	99	99	R	45	45	0	F	45	45	DILTEND	1.00
S	50	99	99	R	45	45	45	F	0	45	DILTEND	0.21
S	50	99	99	R	45	45	45	F	45	45	DILTEND	0.73

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S	99	1	1	R	0	0	0	F	0	45	DILTEND	0.50
S	99	1	1	R	0	0	0	F	45	45	DILTEND	0.50
S	99	1	1	R	0	0	45	F	0	45	DILTEND	0.75
S	99	1	1	R	0	0	45	F	45	45	DILTEND	0.27
S	99	1	1	R	0	45	0	F	0	45	DILTEND	0.00
S	99	1	1	R	0	45	0	F	45	45	DILTEND	0.27
S	99	1	1	R	0	45	45	F	0	45	DILTEND	0.27
S	99	1	1	R	0	45	45	F	45	45	DILTEND	0.08
S	99	1	1	R	45	0	0	F	0	45	DILTEND	0.50
S	99	1	1	R	45	0	0	F	45	45	DILTEND	0.50
S	99	1	1	R	45	0	45	F	0	45	DILTEND	0.98
S	99	1	1	R	45	0	45	F	45	45	DILTEND	0.75
S	99	1	1	R	45	45	0	F	0	45	DILTEND	0.27
S	99	1	1	R	45	45	0	F	45	45	DILTEND	0.00
S	99	1	1	R	45	45	45	F	0	45	DILTEND	0.79
S	99	1	1	R	45	45	45	F	45	45	DILTEND	0.27
S	99	1	50	R	0	0	0	F	0	45	DILTEND	0.25
S	99	1	50	R	0	0	0	F	45	45	DILTEND	0.38
S	99	1	50	R	0	0	45	F	0	45	DILTEND	0.50
S	99	1	50	R	0	0	45	F	45	45	DILTEND	0.15
S	99	1	50	R	0	45	0	F	0	45	DILTEND	0.00
S	99	1	50	R	0	45	0	F	45	45	DILTEND	0.26
S	99	1	50	R	0	45	45	F	0	45	DILTEND	0.26
S	99	1	50	R	0	45	45	F	45	45	DILTEND	0.05
S	99	1	50	R	45	0	0	F	0	45	DILTEND	0.38
S	99	1	50	R	45	0	0	F	45	45	DILTEND	0.25
S	99	1	50	R	45	0	45	F	0	45	DILTEND	0.85
S	99	1	50	R	45	0	45	F	45	45	DILTEND	0.50
S	99	1	50	R	45	45	0	F	0	45	DILTEND	0.26
S	99	1	50	R	45	45	0	F	45	45	DILTEND	0.00
S	99	1	50	R	45	45	45	F	0	45	DILTEND	0.76
S	99	1	50	R	45	45	45	F	45	45	DILTEND	0.26
S	99	50	1	R	0	0	0	F	0	45	DILTEND	0.50
S	99	50	1	R	0	0	0	F	45	45	DILTEND	0.38
S	99	50	1	R	0	0	45	F	0	45	DILTEND	0.62
S	99	50	1	R	0	0	45	F	45	45	DILTEND	0.26
S	99	50	1	R	0	45	0	F	0	45	DILTEND	0.00
S	99	50	1	R	0	45	0	F	45	45	DILTEND	0.15
S	99	50	1	R	0	45	45	F	0	45	DILTEND	0.15
S	99	50	1	R	0	45	45	F	45	45	DILTEND	0.07
S	99	50	1	R	45	0	0	F	0	45	DILTEND	0.38
S	99	50	1	R	45	0	0	F	45	45	DILTEND	0.50
S	99	50	1	R	45	0	45	F	0	45	DILTEND	0.61
S	99	50	1	R	45	0	45	F	45	45	DILTEND	0.62
S	99	50	1	R	45	45	0	F	0	45	DILTEND	0.15
S	99	50	1	R	45	45	0	F	45	45	DILTEND	0.00
S	99	50	1	R	45	45	45	F	0	45	DILTEND	0.43
S	99	50	1	R	45	45	45	F	45	45	DILTEND	0.15
S	99	50	50	R	0	0	0	F	0	45	DILTEND	0.50
S	99	50	50	R	0	0	0	F	45	45	DILTEND	0.50
S	99	50	50	R	0	0	45	F	0	45	DILTEND	0.75
S	99	50	50	R	0	0	45	F	45	45	DILTEND	0.27
S	99	50	50	R	0	45	0	F	0	45	DILTEND	0.00
S	99	50	50	R	0	45	0	F	45	45	DILTEND	0.27
S	99	50	50	R	0	45	45	F	0	45	DILTEND	0.27
S	99	50	50	R	0	45	45	F	45	45	DILTEND	0.08
S	99	50	50	R	45	0	0	F	0	45	DILTEND	0.50
S	99	50	50	R	45	0	0	F	45	45	DILTEND	0.50
S	99	50	50	R	45	0	45	F	0	45	DILTEND	0.98
S	99	50	50	R	45	0	45	F	45	45	DILTEND	0.75
S	99	50	50	R	45	45	0	F	0	45	DILTEND	0.27
S	99	50	50	R	45	45	0	F	45	45	DILTEND	0.00
S	99	50	50	R	45	45	45	F	0	45	DILTEND	0.79
S	99	50	50	R	45	45	45	F	45	45	DILTEND	0.27

4. Data flow and user interface

4.1 For each keyboard control, provide a GUI button or menu option that performs the same function

Plot Tendency viewer window

Keyboard key	Equivalent GUI button or menu
.	Plot Tendency Options Adjust Strike button
,	Plot Tendency Options Adjust Strike button
m	Plot Tendency Options Adjust Dip button
n	Plot Tendency Options Adjust Dip button
[Print Screen]	Plot Tendency Print button

Stress Ratio Graph viewer window

l	Right mouse button
Keyboard key	Equivalent GUI button or menu
[Print Screen]	Stress Ratio Graph Print button

3-D Fault viewer window

Keyboard key	Equivalent GUI button or menu
o	Middle mouse button
i	Middle mouse button
r	3D Fault Reset button
[Spacebar]	3D Fault Options Select Mode buttons
[F9]	3D Fault Options Show Axis button
[F10]	3D Fault Options Average Mode button
[F11]	3D Fault Options Rotate Mode buttons
[F12]	3D Fault Options Display buttons
[Print Screen]	3D Fault Print button

Map viewer window

Keyboard key	Equivalent GUI button or menu
o	Middle mouse button
i	Middle mouse button
r	Map Reset button
[Print Screen]	Map Print button

Surface viewer window

Keyboard key	Equivalent GUI button or menu
o	Middle mouse button
i	Middle mouse button
r	Surface Reset button
[F8]	Surface Options Bounding Box button
[F9]	Surface Options Base button
[F10]	Surface Options Axis button
[F11]	Surface Options Points buttons
[F12]	Surface Display buttons
[Print Screen]	Surface Print button

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5. Programming language

5.1 Utilize the C++ programming language and compiler to construct 3DStress

- a. Verify that the source files used to create 3DStress are written using the C++ language. The C++ compiler on the SGI system is called CC as shown in the example compile execution below.

```
CC -O viewNet.c++ -o ../bin/3dstress.exp linFileClass.o
surfClass.o      surfCallbacks.o      graphClass.o
graphCallbacks.o viewerClass.o viewerCallbacks.o
gfxCallbacks.o  gfxClass.o  viewClass.o  sceneClass.o
axesClass.o     overlayClass.o cmdClass.o  plotClass.o
lineClass.o     boundBox.o  remove.o  vectorClass.o
rotClass.o      mapClass.o  mapCallbacks.o  roseClass.o
roseCallbacks.o roseButtonCB.o viewerButtonCB.o
gfxButtonCB.o   surfButtonCB.o controlClass.o
controlerCallbacks.o mapButtonCB.o optionClass.o
optionCallbacks.o covClass.o graphButtonCB.o
gfxOptionClass.o gfxOptionCB.o viewerOptionClass.o
viewerOptionCB.o surfOptionClass.o surfOptionCB.o
mapOptionClass.o mapOptionCB.o covWidgetClass.o
covWidgetCB.o  overlayWidgetClass.o overlayWidgetCB.o
roseOptionClass.o roseOptionCB.o vblFile.o fileShower.o
destroyFS.o    saveWindow.o infoWidget.o helpWidget.o
notice.o       -L../libs -lGLU -lGLw -lXm -lXt -lGL -lX11
-lm -lXpm
```

6. Hardware platforms

6.1 Execute 3DStress on Silicon Graphics workstations operating IRIX 5.3

- a. On the system executing 3DStress type the following command to verify the operating system number.

```
% uname -a
IRIX performer 5.3 11091811 IP19 mips
```

- b. Verify that the IRIX version number is 5.3.

7. Graphic output devices

7.1 Store screen displays to raster image files

- a. For each of the following windows, open the window, select the Print button, select a file name (rgb) to save the raster image file.

Tendency Plot window
Stress Ratio Graph window
3D Fault Viewer window
Map Viewer window
Surface Viewer window

- b. Display each of the saved images on the screen using the ipaste command as shown below.

```
% ipaste file.rgb
```

8. Summary

The preceding test procedures were conducted on 3DStress, version 1.2, on October 15, 1996. 3DStress was executed on a Silicon Graphics Onyx workstation named performer located in the CNWRA GIS lab in San Antonio, Texas. The computed values and displays from 3DStress were compared to the values and figures in this document and found to be in complete agreement.

Software Developer: Brent Harkin Date: 10/31/96

Element Manager: H. Lawrence III Keyes Date: 10/31/96

Installation Test for 3DStress Version 1.2

October 31, 1996

I. Introduction

This document specifies the installation testing procedure and results for 3DStress version 1.2. The installation test is used to verify that the software is properly installed on a target system as required by CNWRA Technical Operating Procedure TOP-018, Revision 4, section 5.6. 3DStress is an application program for interactively computing and displaying the slip and dilation tendency of faults and fractures. Refer to the Software Requirements Description and the user's manual for 3DStress, version 1.2 for more information on using 3DStress.

II. Test Procedure

1. Install the 3DStress program in a subdirectory. The following files are required:

3dstress	(executable file)
.3dstress_help	(showcase help file)

The permissions of the above files must be set so that users may access and execute these files. The help file requires the *showcase* software application from Silicon Graphics to be loaded. See your local site administrator for help installing 3DStress and *showcase*.

2. Execute 3DStress by changing the current directory to the directory that contains the 3DStress executable file or by adding the directory to your *path* environmental variable. For example, to modify the *path* variable enter the following command:

```
% set path = ( $path 3dstress_directory )
```

Where *3dstress_directory* is the name of the directory that contains the 3DStress executable file.

3. Check the version number of the 3DStress executable by entering the following command. Verify that the version number is 1.2.

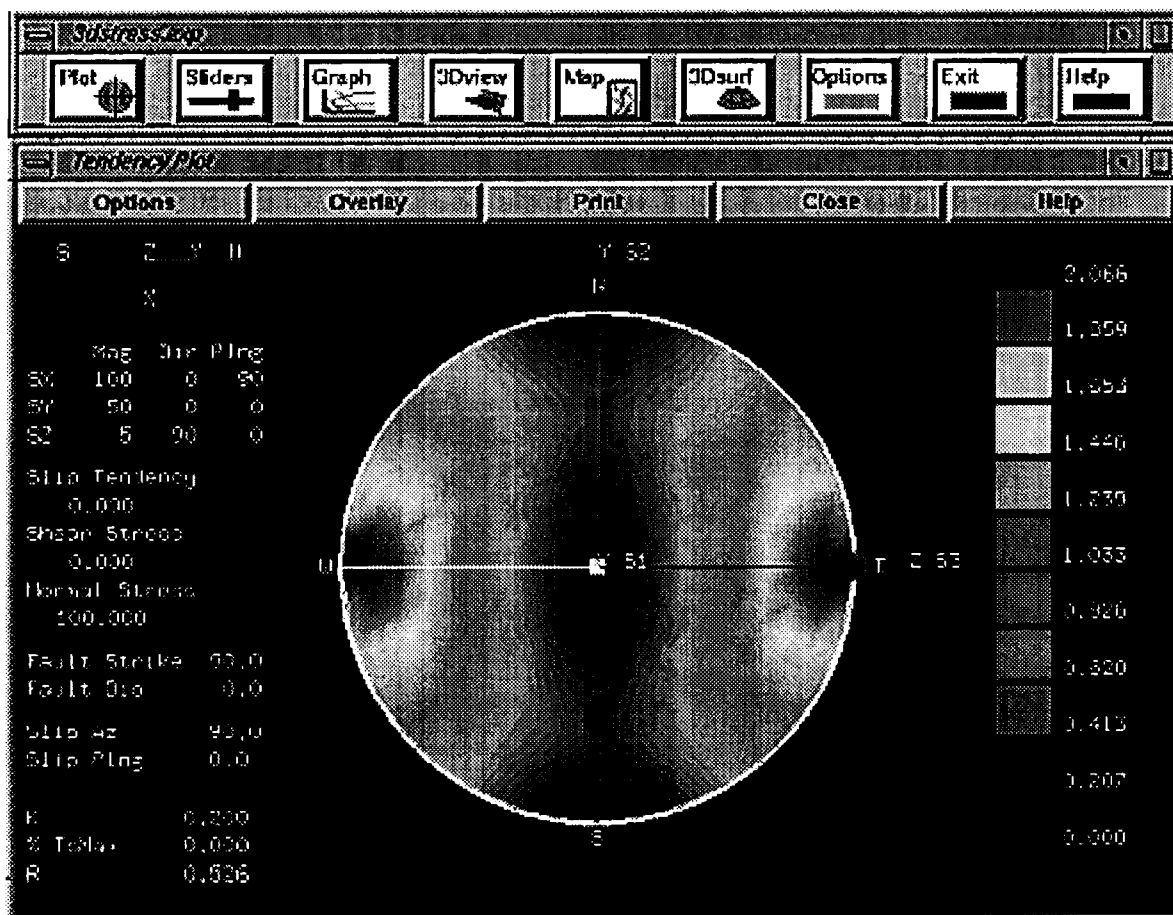
```
% 3dstress -h

@(#)3dstress 09-30-96 Rev 1.2
Usage: 3dstress [-f font size]
        [-b button color]
        [-c window color]
        [-h help]
        -r filename
        -d sx sy sz   rx ry rz   fstrike fdip
        [Dilation tendency]
        -s sx sy sz   rx ry rz   fstrike fdip
        [Slip tendency]
```

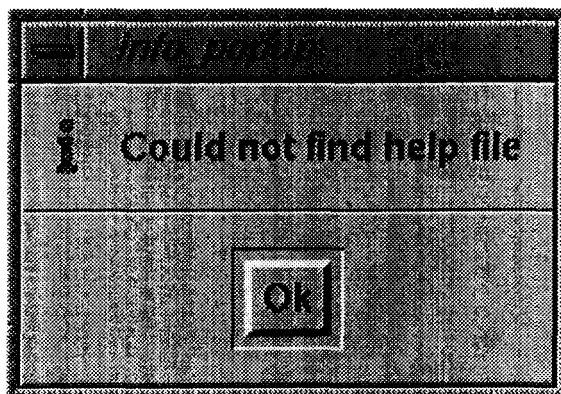
4. Execute 3DStress by typing the following command:

```
% 3dstress
```

The main control and Tendency Plot windows should appear as shown below.



5. If you execute 3DStress from the directory where the help file is located, 3DStress will automatically find the help file. However, if you execute 3DStress from another directory an error message will be displayed as shown below.



If you encounter the error message above, exit 3DStress and enter the following command:

```
% setenv 3DSTRESS_HOME help_file_directory
```

Where *help_file_directory* is the name of the directory where the help file is currently located.

For example, if the help file is loaded in /usr/local/bin, then enter:

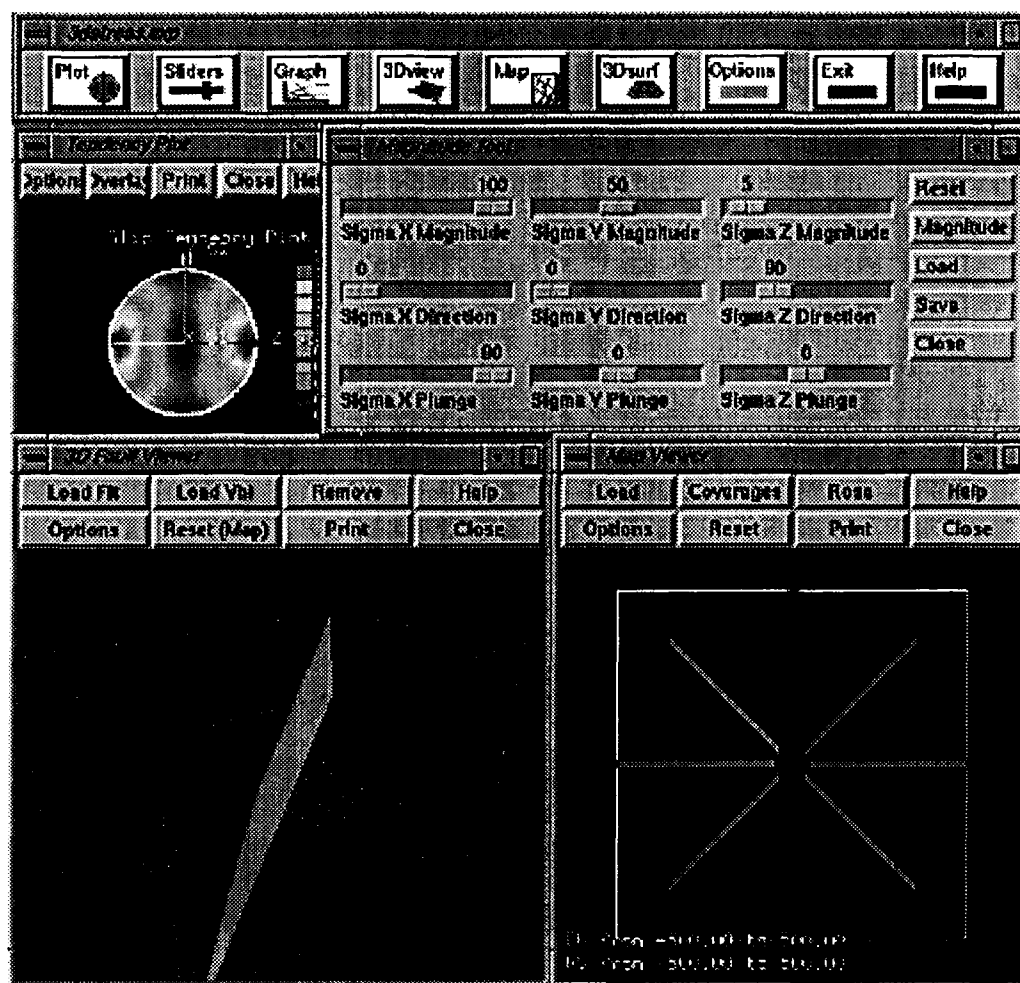
```
% setenv 3DSTRESS_HOME /usr/local/bin
```

Now execute 3DStress and verify that the above error message does not appear.

- Open the 3Dview, Sliders, and Map windows. Use the Load Vbl button in the 3D Fault Viewer window to load 3-D fault files also called Vbl files.

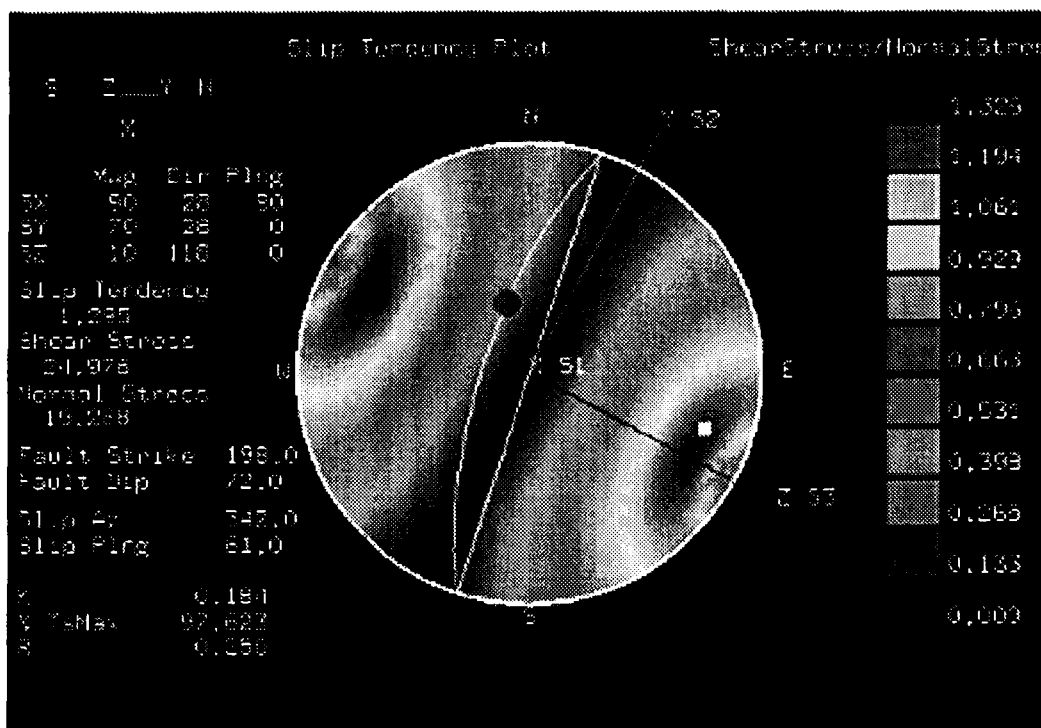
Vbl files are created using a text editor or written from the 3DMove software system from Midland Valley Exploration. The files tc1.vbl and tc3.vbl are both shown in the 3D Fault Viewer window below.

Use the Load button in the Map Viewer window to load a 2-D coverage file also called a Lin file. Lin files are created using a text editor or by exporting line coverages from the ARC/INFO software system from ESRI. The file angles45.lin is shown in the Map Viewer window below. Verify that the fault and line files load and display correctly. The display should look similar to the figure below.



8. Use the sliders to modify the stress magnitudes and orientations to the following values: Sigma X Magnitude 90, Sigma Y Magnitude 70, Sigma Z Magnitude 10, Sigma X Direction 28, Sigma X Plunge 90, Sigma Y Direction 28, Sigma Z Direction 118.

Press the left mouse button in the Tendency Plot window and move the cursor to select a fault orientation of strike 198 and dip 72. Verify that the following values are displayed in the Tendency Plot window: Slip Tendency 1.3, Shear Stress 24.9, and Normal Stress 19.3.



9. If a problem is noted in any of the above tests then reinstall 3DStress and repeat these tests. If the problem still occurs then contact:

David Ferrill
 CNWRA
 6220 Culebra Road
 San Antonio, TX 78238
 (210) 522-6082 voice
 (210) 522-5155 fax
 dferrill@swri.edu

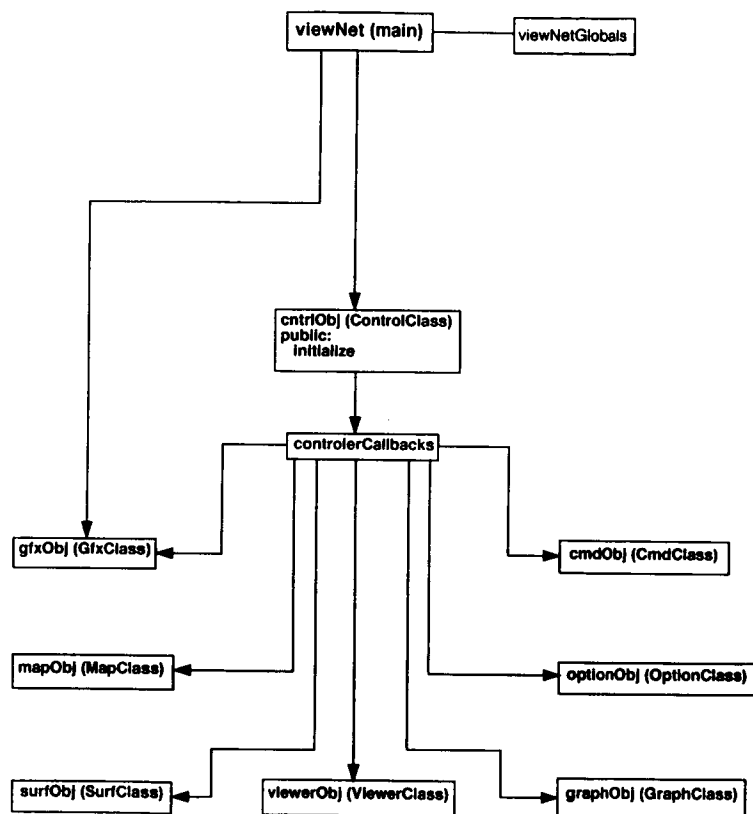
III Summary

Installation testing of 3DStress, version 1.2, was conducted on October 17, 1996. The software was executed on a Silicon Graphics Onyx workstation named performer in the CNWRA GIS lab in San Antonio, Texas. The software passed all of the installation tests specified in this report.

Software Developer: _____ Date: _____

Element Manager: _____ Date: _____

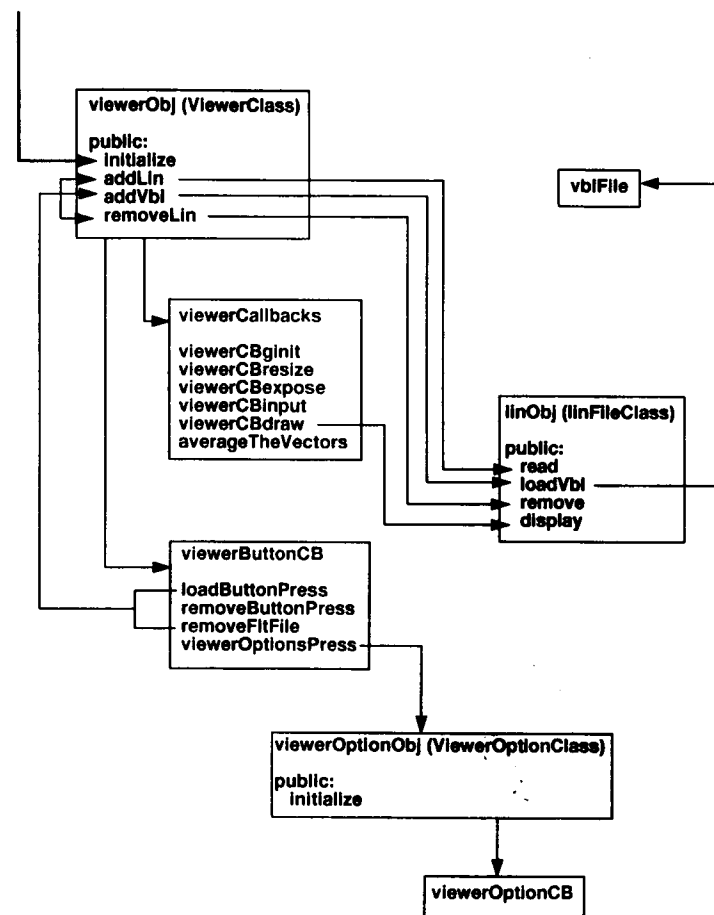
3DStress V1.2 block diagram:



Butt H

10/21/96

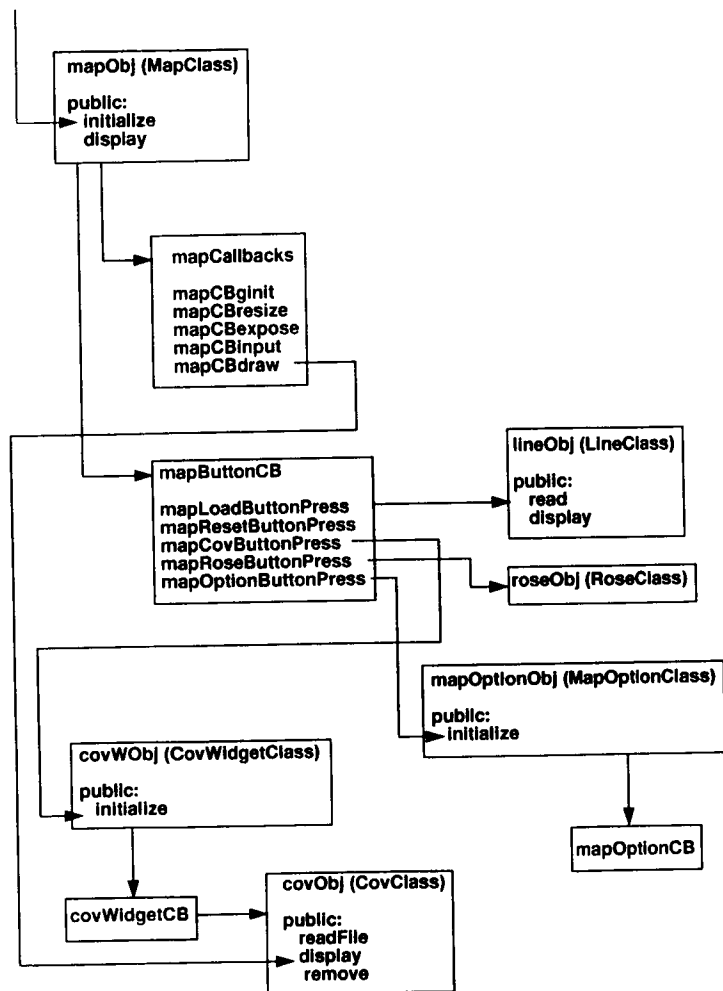
Cont'd



Butt H

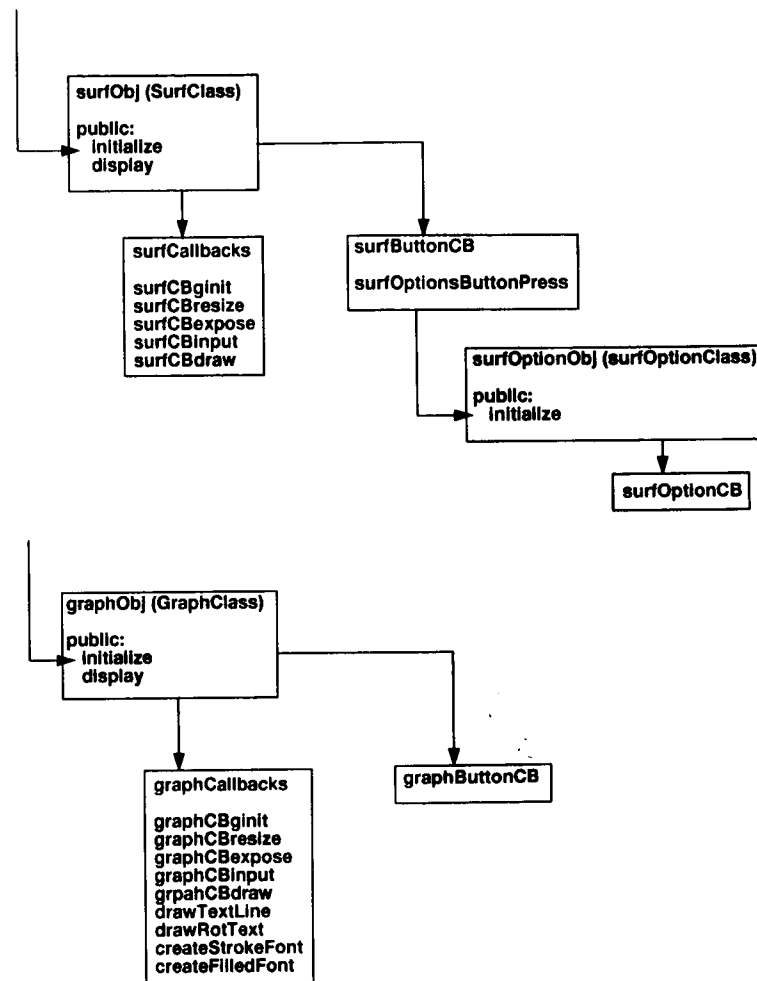
10/31/96

Cont'd



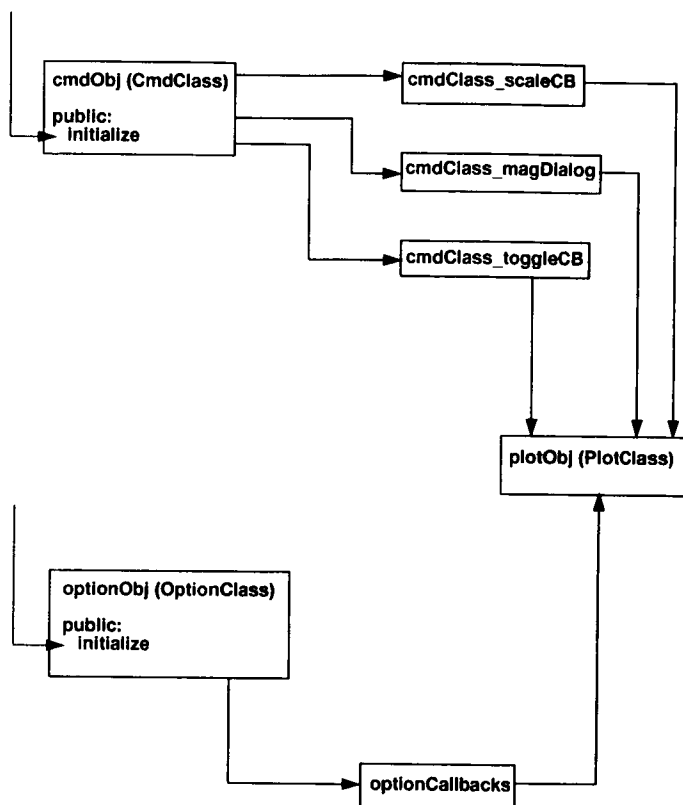
But 1/19/91

Cont'd



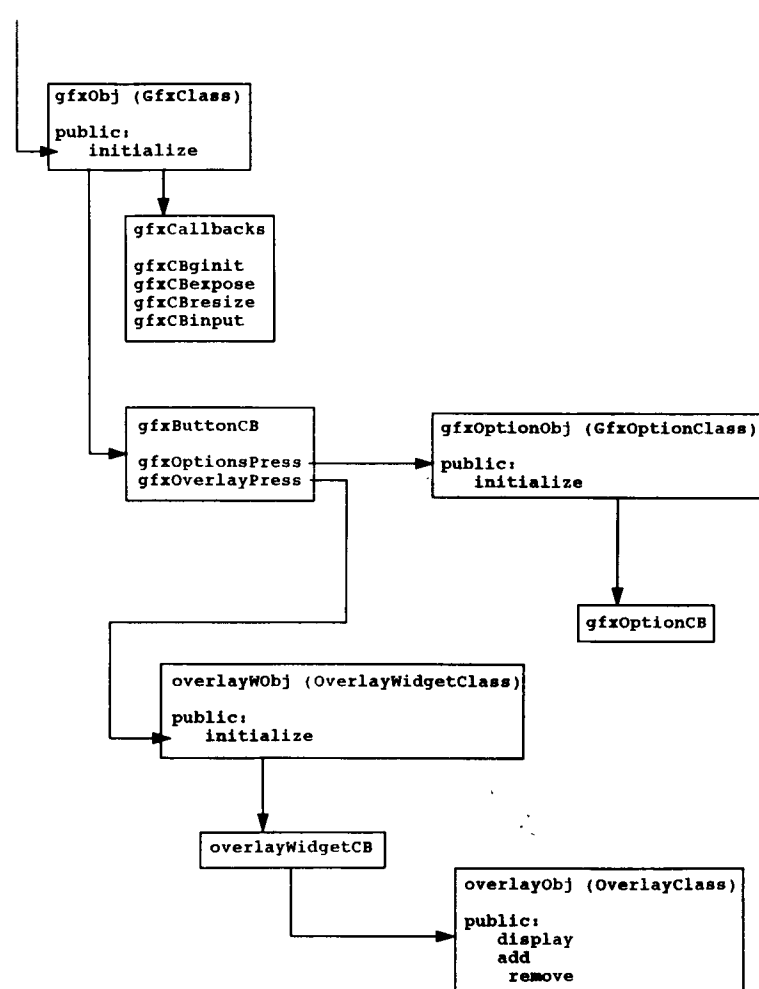
But 1/19/91 2

Cont'd



Butcher 10/31

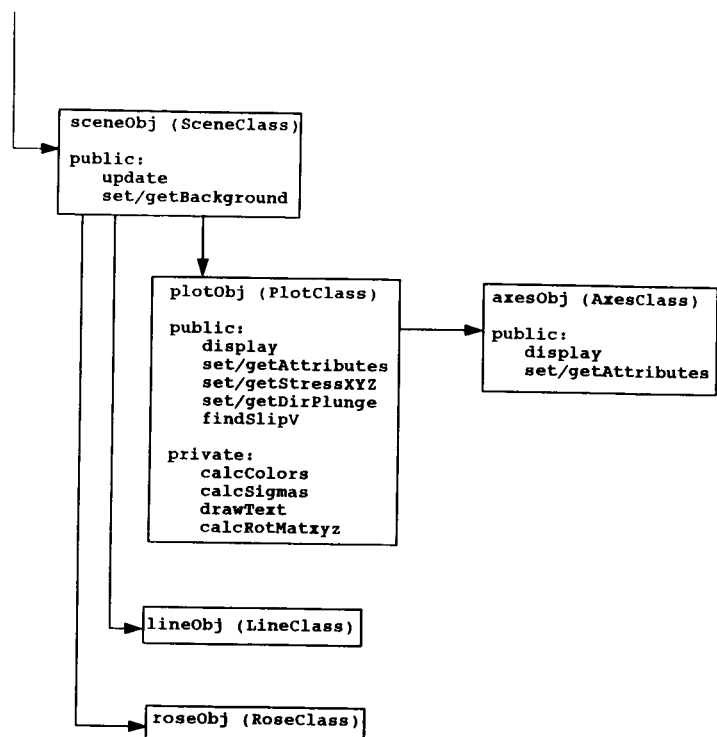
Cont'd



Butcher 10/31/96

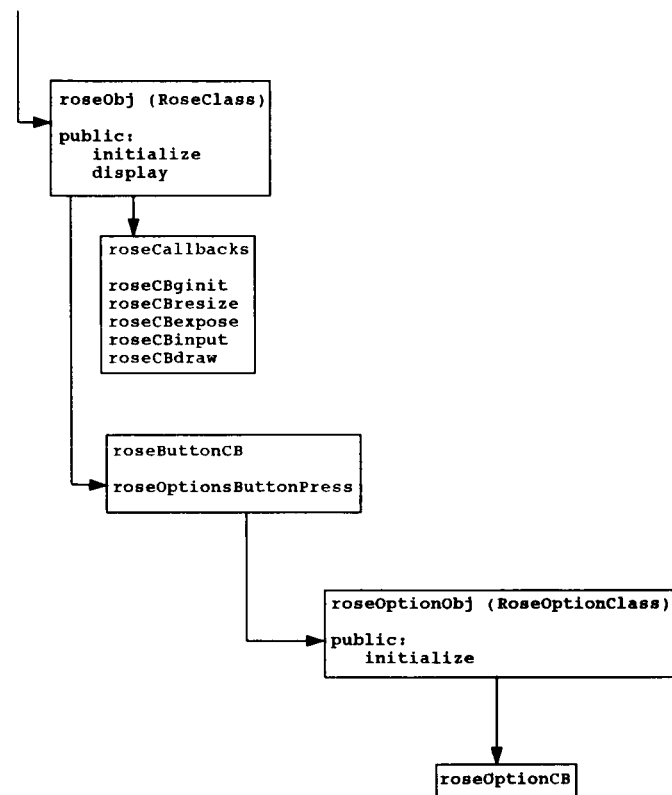
131138

Cont'd



Butcher 10/31/96

Cont'd



Butcher 10/31/96

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3DStress Documents:

3DStress Version 1.2

Software Requirement Description

Date: 8/6/96

Location: 3DStress QA Folder, CNWRA, San Antonio

Source Code and Executable

Date: 10/31/96

Location: 4mm Tape, 3DStress QA Folder, CNWRA, San Antonio

Design Verification Report

Date: 10/31/96

Location: 3DStress QA Folder, CNWRA, San Antonio

Installation Test Report

Date: 10/31/96

Location: 3DStress QA Folder, CNWRA, San Antonio

User's Manual

Date: 10/31/96

Location: 3DStress QA Folder, CNWRA, San Antonio

3DStress Source Code Summary

Oct 31 1996 08:44

rlog

Page 1

/usr/people/rboenau/3d/src

Thu Oct 31 08:43:47 CST 1996

Filename	Rev	Line Count
1. axesClass.c++	1.3	236
2. axesClass.hh	1.2	78
3. axesObj.hh	1.2	43
4. boundBox.c++	1.6	205
5. boundBox.hh	1.2	57
6. cmdClass.c++	1.45	632
7. cmdClass.hh	1.4	62
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Check Sum = 51917 3619 ../bin/3dstress.exp		
../bin/3dstress.exp:		
3dstress 10-30-96 Rev 1.2		

Bret J. H. 10/31/96

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SOFTWARE REQUIREMENTS DESCRIPTION (SRD) 3DSTRESS VERSION 1.2

August 6, 1996

1 INTRODUCTION

3DStress is a software application that computes the tendency for faults and fractures to slip or dilate. Slip tendency is the ratio of the shear stress divided by the normal stress on a fault surface. Dilation tendency is the likelihood for a fault or extension fracture to dilate based on the three-dimensional (3-D) stress conditions and is computed from the normal stress and the principal stresses. The input 3-D stress orientations and magnitudes may be interactively modified through a user interface. Faults and fractures displayed by 3DStress are colored based on the computed slip or dilation tendency. In addition, to slip and dilation tendency, 3DStress computes the expected slip direction by finding the maximum shear stress for the fault surface.

Paragraphs that begin with the label "Version 1.2" summarize features that will be included in 3DStress version 1.2. These features were not included in the previous release.

2 SOFTWARE FUNCTIONS

3DStress performs three primary tasks. First, 3DStress provides a user interface for interactive control of the input stress orientations and magnitudes. Second, 3DStress computes slip tendency, dilation tendency, and slip direction from the input stress parameters and fault surface orientation. And third, 3DStress displays 2-D and 3-D representations of faults and fracture surfaces colored by slip or dilation tendency.

Version 1.2 – The following features will be added to 3DStress version 1.2.

- Read and display line coverages in the map viewer window.
- Display the computed dilation tendency of a user selected fault surface in the plot viewer window.
- Display polygons in the 3D viewer window that have the same orientation as the user selected fault orientation in the plot viewer window.
- Display the slip and normal vectors in the 3D viewer window for user selected polygons.
- Display the fault orientation and it's slip tendency in the plot viewer window that matches the user selected polygon in the 3D viewer window.

3 TECHNICAL BASIS AND MATHEMATICAL MODEL

3DStress is founded on the principals of fault kinematics. These principals state that the input principal stresses can be resolved into a normal stress and a shear stress acting on a fault surface. The normal stress is perpendicular to the fault surface while the shear stress lies in the plane of the fault surface. The greater the ratio of the shear stress to the normal stress, the greater the slip tendency. Friction characteristics and rock material properties are not modeled by 3DStress.

The input principal stresses are labeled as follows:

$$\begin{aligned}\sigma_1 &= \text{maximum principal stress} \\ \sigma_2 &= \text{intermediate principal stress} \\ \sigma_3 &= \text{minimum principal stress}\end{aligned}$$

$$\text{Where: } \sigma_1 > \sigma_2 > \sigma_3$$

The equation for computing slip tendency is given below.

$$T_s = \text{slip tendency} = \frac{\tau_s}{\sigma_n}$$

$$\begin{aligned}\text{Where: } \tau_s &= \text{shear stress} \\ \sigma_n &= \text{normal stress}\end{aligned}$$

The equation for computing dilation tendency is given below.

$$T_d = \text{dilation tendency} = \frac{(\sigma_1 - \sigma_n)}{(\sigma_1 - \sigma_3)}$$

$$\begin{aligned}\text{Where: } \sigma_n &= \text{normal stress} \\ \sigma_1 &= \text{maximum principal stress} \\ \sigma_3 &= \text{minimum principal stress}\end{aligned}$$

4 DATA FLOW AND USER INTERFACES

In order to compute slip or dilation tendency, two sets of input data are required. First, the input principal stresses orientations and magnitudes are needed. Second, the fault surface orientation is required. From these inputs, the stresses normal and shear to the fault surface are computed. Finally, slip or dilation tendency is computed from the principal, normal, and shear stresses.

The user interface enables the user to input the principal stresses orientations and magnitudes and to select a particular fault surface orientation. In addition, the user may select a 2-D or 3-D fault coverage that is displayed and colored by slip or dilation tendency.

Version 1.2 – The user interface in 3DStress version 1.2 will allow button or menu entry of display controls in addition to the current keyboard controls.

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5 PROGRAMMING LANGUAGE

3DStress is written in the C++ programming language using an object oriented design. The program utilizes the OpenGL graphics and Motif libraries supplied on Silicon Graphics workstations. The OpenGL libraries provide 2-D and 3-D graphics rendering capabilities. The Motif libraries are used to create the graphical user interface to the program.

6 HARDWARE PLATFORMS

3DStress executes on Silicon Graphics workstations. The program is compatible with the IRIX 5.3 operating system.

7 GRAPHICS OUTPUT DEVICES

Screen displays of 3DStress may be saved and printed using utilities such as scrsave, snapshot, imgworks, and showcase. These utilities are provided by Silicon Graphics on their workstations.

Version 1.2 – Users may select to store the graphics window displays to raster files in 3DStress version 1.2 through a user interface menu.

8 SUMMARY

3DStress is an interactive tool for computing and displaying the slip and dilation tendency for faults and fractures. The input stress orientations and magnitudes are controlled by a user interface. The slip or dilation tendency and expected slip direction are computed for the fault surface orientation using the input stress conditions. The 2-D and 3-D fault representations displayed by 3DStress are colored by slip or dilation tendency. The program executes on Silicon Graphics workstations.

(D:\Henderson\B)

APPROVED 9/16/96
A. L. Lauer McKee

Design Verification Report for 3DStress Version 1.2

October 31, 1996

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1. Introduction

3DStress is a software application for computing the slip and dilation tendency of faults and fractures. This report specifies the test procedures and results used to verify the correct functionality of 3DStress, version 1.2. The design verification report is required by CNWRA Technical Operating Procedure TOP-018, Revision 4, section 5.5. These tests verify the functionality of the features described in 3DStress, version 1.2, Software Requirements Document (SRD), August 6, 1996 (stored in the QA folder for 3DStress, version 1.2). This report includes the test procedures for testing the software functions, technical basis, data flow and interface, programming language, hardware platforms, and graphic output devices specified in the SRD. The results from conducting these tests are included in the summary of this report.

2. Software functions

The following test procedures are used to verify correct software functionality of 3DStress. Several windows are displayed by 3DStress including a Tendency Plot viewer, Tendency Surface viewer, Sliders, Graph viewer, Options, 2D viewer, and 3D viewer. See the 3DStress users manual for descriptions of these windows and more detailed instructions on the use of 3DStress.

2.1 Test graphical user interface (GUI) control of stress magnitudes and orientations.

- a. Open the Sliders and Tendency Plot windows.
- b. Using the mouse to operate the sliders, adjust the input stress magnitudes and orientations.
- c. Verify that the Tendency Plot colors change as the input stress values are modified.

2.2 Compute slip tendency, dilation tendency, and slip direction for a fault surface orientation given specific 3D stress conditions.

- a. Open the Sliders, Options, and Tendency Plot windows.
- b. Using the mouse to operate the sliders, adjust the input stress magnitudes and orientations to each of the values in the following table.
- c. Switch between slip and dilation tendency using the buttons on the Options window.
- d. For each input stress condition, verify the slip tendency, dilation tendency, and slip directions according to the table below.

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```
# Program: 3dstress:
# 3dstress 09-30-96 Rev 1.2
# Execution date: Wed Sep 25 14:58:25 CDT 1996
# Test file: tcasel.dat
# sigmaX sigmaY sigmaZ    rotX rotY rotZ    fltStrike fltDip    slipAzimuth slipPlunge
slipTendency
S 100  60  10  R    0    0    0  F 144  75    SLIP_VECTOR 312  36  SLIPTEND 0.91
S   60 100  10  R    0    0    0  F 144  75    SLIP_VECTOR 322   6  SLIPTEND 0.98
S   10 100  60  R    0    0    0  F 144  75    SLIP_VECTOR 156  39  SLIPTEND 0.35
S 100   10  60  R    0    0    0  F 144  75    SLIP_VECTOR 153  30  SLIPTEND 0.58
S   10  60 100  R    0    0    0  F 144  75    SLIP_VECTOR 308  44  SLIPTEND 0.33
S   60  10 100  R    0    0    0  F 144  75    SLIP_VECTOR 323   2  SLIPTEND 0.61
S 100   60  10  R    0    0    0  F 173  54    SLIP_VECTOR 274  53  SLIPTEND 1.03
S   60 100  10  R    0    0    0  F 173  54    SLIP_VECTOR 295  49  SLIPTEND 0.88
S   10 100  60  R    0    0    0  F 173  54    SLIP_VECTOR 247  52  SLIPTEND 0.57
S 100   10  60  R    0    0    0  F 173  54    SLIP_VECTOR 239  51  SLIPTEND 0.27
S   10  60 100  R    0    0    0  F 173  54    SLIP_VECTOR 271  53  SLIPTEND 0.62
S   60  10 100  R    0    0    0  F 173  54    SLIP_VECTOR 302  46  SLIPTEND 0.24
S 100   60  10  R    0    0    0  F  36  51    SLIP_VECTOR  86  43  SLIPTEND 0.71
S   60 100  10  R    0    0    0  F  36  51    SLIP_VECTOR  45  12  SLIPTEND 0.71
S   10 100  60  R    0    0    0  F  36  51    SLIP_VECTOR 162  44  SLIPTEND 0.71
S 100   10  60  R    0    0    0  F  36  51    SLIP_VECTOR 172  40  SLIPTEND 0.51
S   10  60 100  R    0    0    0  F  36  51    SLIP_VECTOR  93  46  SLIPTEND 0.72
S   60  10 100  R    0    0    0  F  36  51    SLIP_VECTOR  40   5  SLIPTEND 0.51
```

2.3 Display 2D representations of faults colored by slip or dilation tendency.

- Open the 2D Map viewer, Tendency Plot, and Sliders windows.
- Load the following Lin file in the 2D Map viewer (angles45.lin):

```

100
  0.00      50.00
  0.00     500.00
END
101
  35.36      35.36
 353.55     353.55
END
102
  50.00      0.00
 500.00      0.00
END
103
  35.36     -35.36
 353.55    -353.55
END
104
  0.00     -50.00
  0.00    -500.00
END
105
 -35.36     -35.36
-353.55    -353.55
END
106
 -50.00      0.00
-500.00      0.00
END
107
 -35.36      35.36
-353.55     353.55
END
END

```

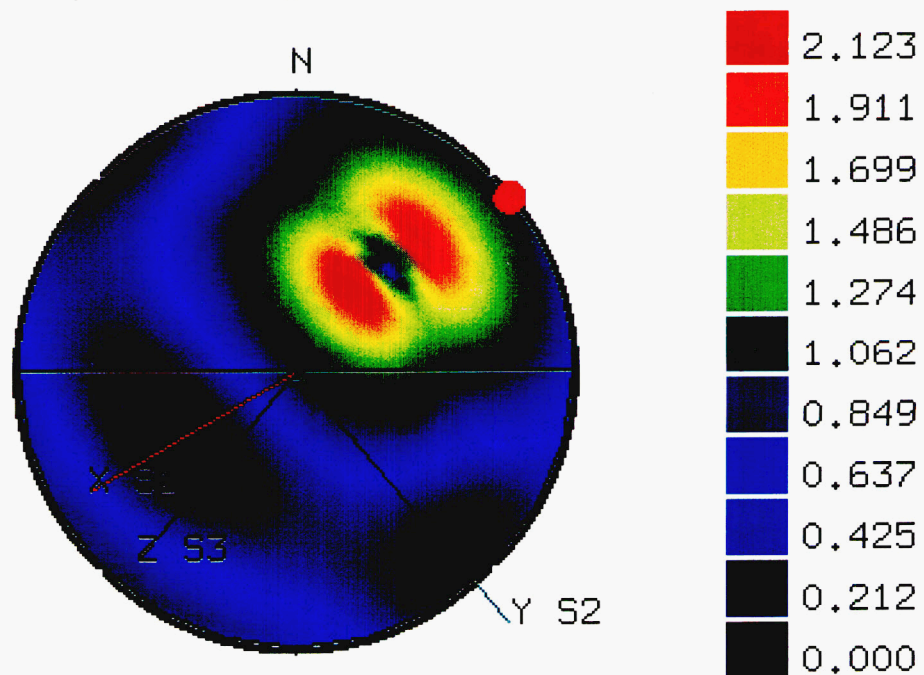

- c. Press the Reset button in the Sliders window. Then set the sliders in the following order: X Plunge slider to 45, X Direction slider to 240, and Y Direction slider to 140. Set the X Magnitude to 100, the Y Magnitude to 50, and the Z Magnitude to 5. Verify that the following values are displayed in the Tendency Plot window:

	Magnitude	Direction	Plunge
X	100	240	45
Y	50	140	10
Z	5	40	43

The direction and plunge values in the Tendency Plot and Sliders windows may not be identical. The plunge values in the Sliders window range from -90 to 90 to enable all possible 3D stress orientations. The plunge values in the Tendency Plot window range from 0 to 90 in order to show the location of the stress axes in the lower hemisphere plot.

- d. Verify that the Tendency Plot viewer appears to be colored similar to the figure below.

Slip Tendency Plot



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e. Select the Options button on the 2D Map viewer window and select the Color Lines By Max Along Strike and the Browse Data button. Verify that the data matches the following values and that the lines in the 2D Map viewer are colored similar to the figure below.

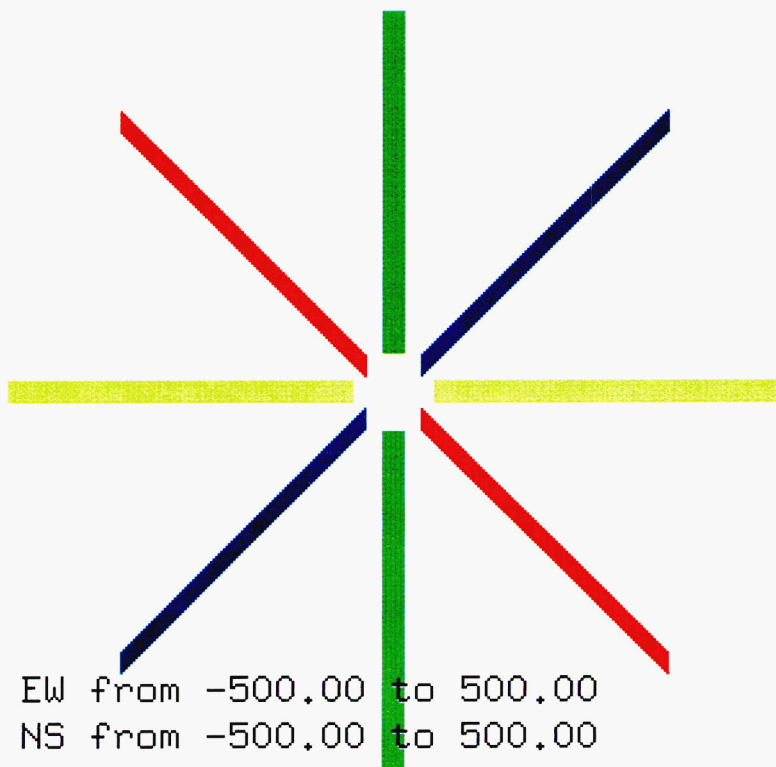
```
#Created by: @(#)3dstress 09-30-96 Rev 1.2
#Date: Thu Oct 3 11:24:22 1996
```

```
#Generated by: Map Viewer
#Loaded file: angles45.lin
```

```
      Mag      Dir      Plng
SX  100 240  45
SY   50 140  10
SZ    5  40  43
```

```
#X-Y-Tendency-Strike
```

```
      100
0.000000 50.000000 NULL NULL
0.000000 500.000000 1.283921 0.0
END
      101
35.360000 35.360000 NULL NULL
353.550000 353.550000 0.876329 45.0
END
      102
50.000000 0.000000 NULL NULL
500.000000 0.000000 1.525768 90.0
END
      103
35.360000 -35.360000 NULL NULL
353.550000 -353.550000 2.105636 135.0
END
      104
0.000000 -50.000000 NULL NULL
0.000000 -500.000000 1.283921 0.0
END
      105
-35.360000 -35.360000 NULL NULL
-353.550000 -353.550000 0.876329 45.0
END
      106
-50.000000 0.000000 NULL NULL
-500.000000 0.000000 1.525768 90.0
END
      107
-35.360000 35.360000 NULL NULL
-353.550000 353.550000 2.105636 135.0
END
END
```



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- f. Select the Options button on the 2D Map viewer window and select the Color Lines By Dip Scale option, Dip Direction East, and Fault Dip Scale 30. Verify that the data matches the following values and that the lines in the 2D Map viewer are colored similar to the figure below.

```
#Created by: @(#)3dstress 09-30-96 Rev 1.2
#Date: Thu Oct 3 11:26:47 1996
```

```
#Generated by: Map Viewer
#Loaded file: angles45.lin
```

```
      Mag      Dir      Plng
SX  100 240  45
SY   50 140  10
SZ    5  40  43
```

```
#X-Y-Tendency-Strike
```

```
      100
0.000000 50.000000 NULL NULL
0.000000 500.000000 0.374165 0.00
END
```

```
      101
35.360000 35.360000 NULL NULL
353.550000 353.550000 0.719862 45.00
END
```

```
      102
50.000000 0.000000 NULL NULL
500.000000 0.000000 0.421486 90.00
END
```

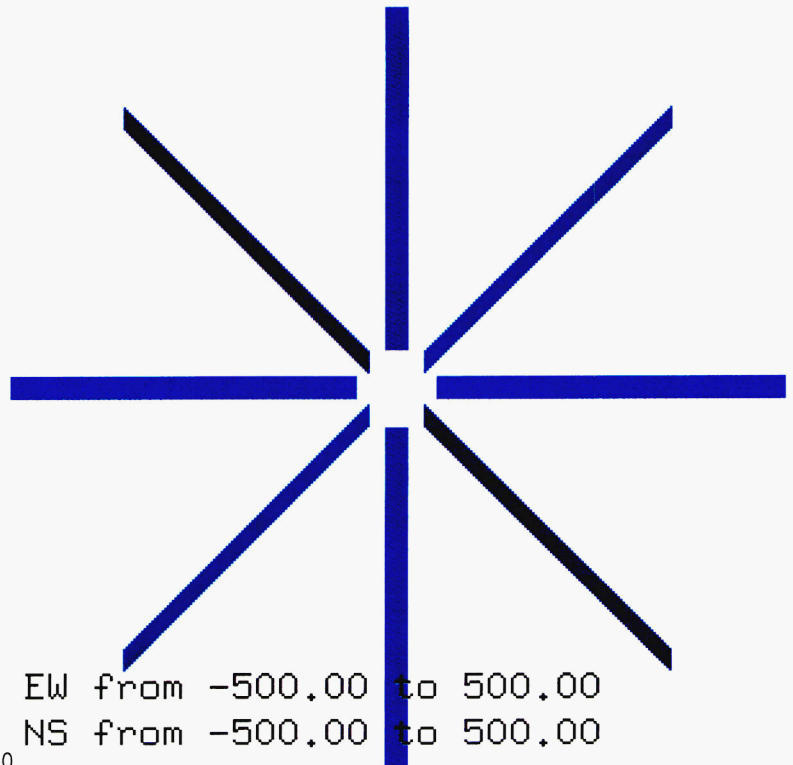
```
      103
35.360000 -35.360000 NULL NULL
353.550000 -353.550000 0.254490 135.00
END
```

```
      104
0.000000 -50.000000 NULL NULL
0.000000 -500.000000 0.374165 0.00
END
```

```
      105
-35.360000 -35.360000 NULL NULL
-353.550000 -353.550000 0.719862 45.00
END
```

```
      106
-50.000000 0.000000 NULL NULL
-500.000000 0.000000 0.421486 90.00
END
```

```
      107
-35.360000 35.360000 NULL NULL
-353.550000 353.550000 0.254490 135.00
END
END
```



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- g. Select the Options button on the 2D Map viewer window and select the Color Lines By Dip Angle option, Dip Direction West, and Fault Dip Scale 30. Verify that the data matches the following values and that the lines in the 2D Map viewer are colored similar to the figure below.

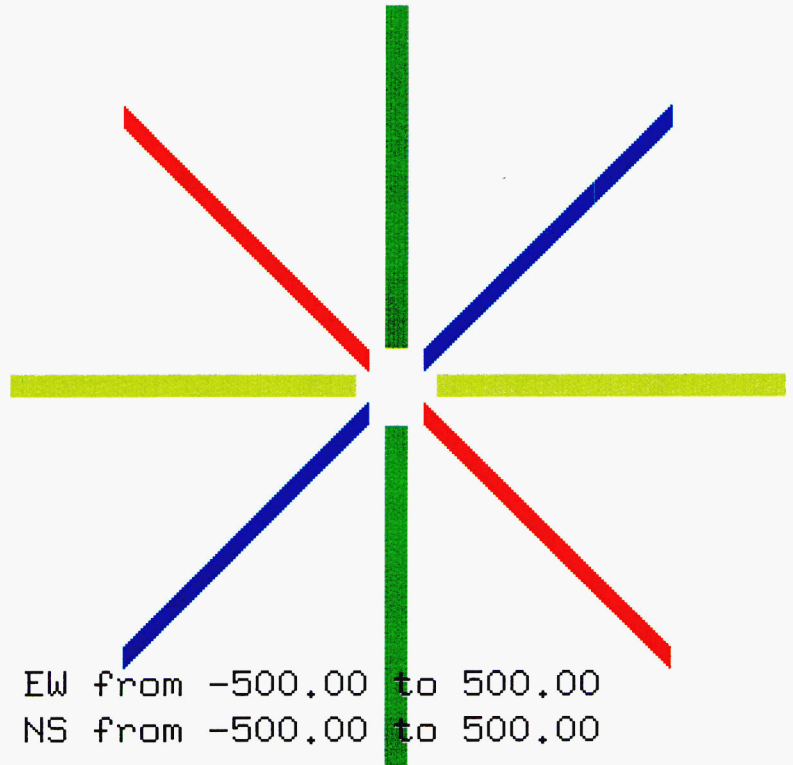
```
#Created by: @(#)3dstress 09-30-96 Rev 1.2
#Date: Thu Oct 3 11:27:08 1996
```

```
#Generated by: Map Viewer
#Loaded file: angles45.lin
```

```
      Mag      Dir      Plng
SX  100 240  45
SY   50 140  10
SZ    5  40  43
```

```
#X-Y-Tendency-Strike
```

```
      100
0.000000 50.000000 NULL NULL
0.000000 500.000000 1.283921 0.0
END
      101
35.360000 35.360000 NULL NULL
353.550000 353.550000 0.781086 45.0
END
      102
50.000000 0.000000 NULL NULL
500.000000 0.000000 1.481839 90.0
END
      103
35.360000 -35.360000 NULL NULL
353.550000 -353.550000 2.026368 135.0
END
      104
0.000000 -50.000000 NULL NULL
0.000000 -500.000000 1.283921 0.0
END
      105
-35.360000 -35.360000 NULL NULL
-353.550000 -353.550000 0.781086 45.0
END
      106
-50.000000 0.000000 NULL NULL
-500.000000 0.000000 1.481839 90.0
END
      107
-35.360000 35.360000 NULL NULL
-353.550000 353.550000 2.026368 135.0
END
END
```



2.4 Display 3D representations of faults colored by slip or dilation tendency.

- Open the 3D Fault viewer, Tendency Plot, Options, and Sliders windows.
- Load the following VBL files in the 3D Fault viewer (tc1.vbl, tc2.vbl, tc3.vbl, tc4.vbl):

File: tc1.vbl

```
#3DMove ASCII Data File V2.00a
Model_Name BSP$Import
Type TIME
Unit METER
Eye_Point 0.0924656 -0.075081 0.0137349
Look_At 0.051498 0.0193591 -0.0110598
X_limits 0 0.0982467
Y_limits 0 0.0332681
Z_limits -0.0197094 0.000358652
Translation 0 0 0
Rotation 0 0
Scale 1 1 1
Num_Of_Surfaces 1
Begin_Surface
Surface_Name Fault_15
Surface_Colour 16777215
Num_Of_Surface_Lines 0
Num_Of_Patches 1
Begin_Patch
Patch_Name Patch
Patch_Colour 16777215
Num_Of_Triangles 2
0 1 2 -1 -1 -1
0 2 3 -1 -1 -1
End_Patch
Num_Of_Vertices 4
0.0 0.0 0.0
10.0 0.0 0.0
10.0 10.0 0.0
0.0 10.0 0.0
End_Surface
Num_Of_Wells 0
```

File: tc2.vbl

```
#3DMove ASCII Data File V2.00a
Model_Name BSP$Import
Type TIME
Unit METER
Eye_Point 0.0924656 -0.075081 0.0137349
Look_At 0.051498 0.0193591 -0.0110598
X_limits 0 0.0982467
Y_limits 0 0.0332681
Z_limits -0.0197094 0.000358652
Translation 0 0 0
Rotation 0 0
Scale 1 1 1
Num_Of_Surfaces 1
Begin_Surface
Surface_Name Fault_15
Surface_Colour 16777215
Num_Of_Surface_Lines 0
Num_Of_Patches 1
Begin_Patch
Patch_Name Patch
Patch_Colour 16777215
Num_Of_Triangles 2
0 1 2 -1 -1 -1
0 2 3 -1 -1 -1
End_Patch
Num_Of_Vertices 4
0.0 0.0 0.0
0.0 10.0 0.0
0.0 10.0 10.0
0.0 0.0 10.0
End_Surface
Num_Of_Wells 0
```

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File: tc3.vbl

```
#3DMove ASCII Data File V2.00a
Model_Name BSP$Import
Type TIME
Unit METER
Eye_Point    0.0924656 -0.075081 0.0137349
Look_At 0.051498 0.0193591 -0.0110598
X_limits  0 0.0982467
Y_limits  0 0.0332681
Z_limits  -0.0197094 0.000358652
Translation 0 0 0
Rotation 0 0
Scale 1 1 1
Num_Of_Surfaces 1
Begin_Surface
Surface_Name Fault_15
Surface_Colour 16777215
Num_Of_Surface_Lines 0
Num_Of_Patches 1
Begin_Patch
Patch_Name Patch
Patch_Colour 16777215
Num_Of_Triangles 2
0 1 2 -1 -1 -1
0 2 3 -1 -1 -1
End_Patch
Num_Of_Vertices 4
0.0    0.0    0.0
10.0   10.0    0.0
15.0   10.0    8.7
5.0    0.0    8.7
End_Surface
Num_Of_Wells 0
```

File: tc4.vbl

```
#3DMove ASCII Data File V2.00a
Model_Name BSP$Import
Type TIME
Unit METER
Eye_Point    0.0924656 -0.075081 0.0137349
Look_At 0.051498 0.0193591 -0.0110598
X_limits  0 0.0982467
Y_limits  0 0.0332681
Z_limits  -0.0197094 0.000358652
Translation 0 0 0
Rotation 0 0
Scale 1 1 1
Num_Of_Surfaces 1
Begin_Surface
Surface_Name Fault_15
Surface_Colour 16777215
Num_Of_Surface_Lines 0
Num_Of_Patches 1
Begin_Patch
Patch_Name Patch
Patch_Colour 16777215
Num_Of_Triangles 2
0 1 2 -1 -1 -1
0 2 3 -1 -1 -1
End_Patch
Num_Of_Vertices 4
10.0    0.0    0.0
10.0   10.0    0.0
15.0   10.0    8.7
15.0    0.0    8.7
End_Surface
Num_Of_Wells 0
```

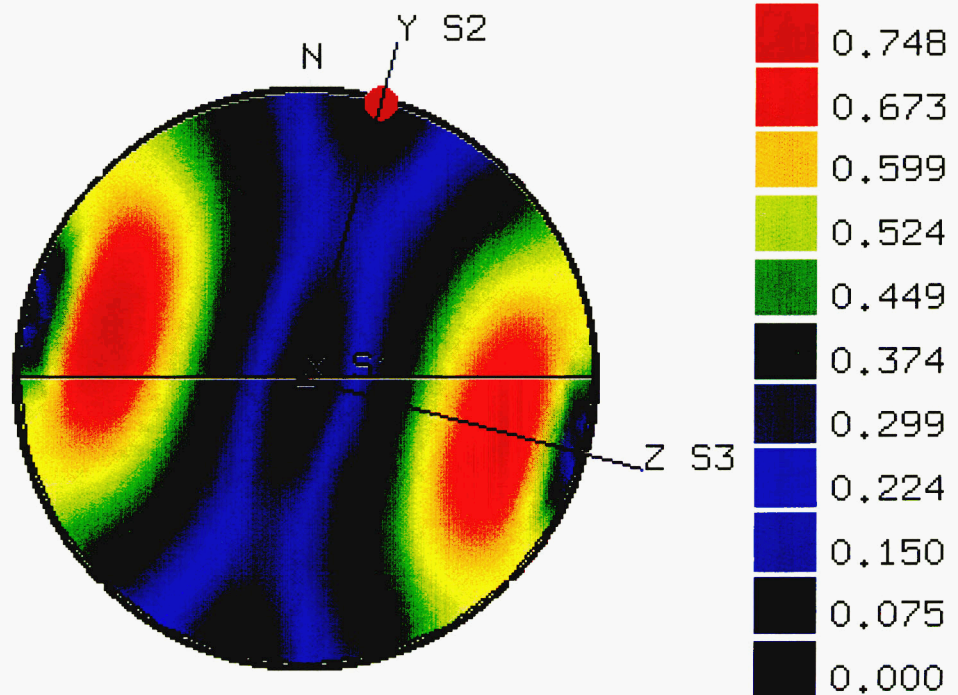

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c. Using the sliders in the Sliders window, set the stress state as follows:

	Magnitude	Direction	Plunge
X	40	15	90
Y	30	15	0
Z	10	105	0

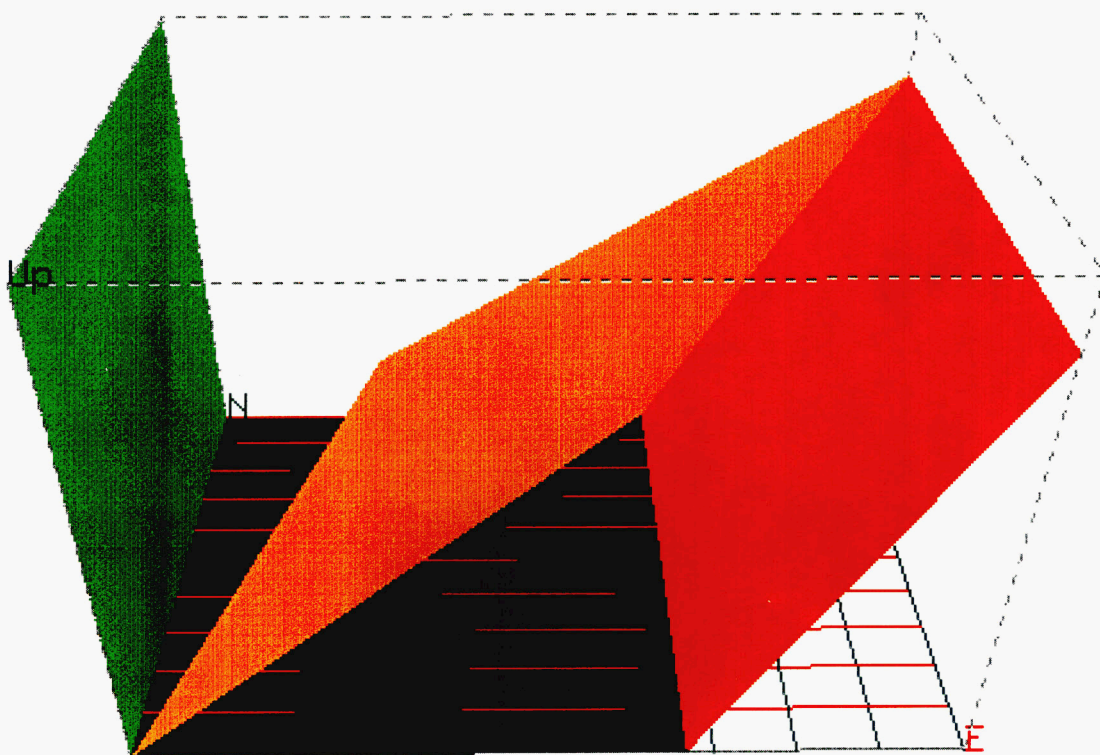
d. Verify that the Tendency Plot viewer appears to be colored similar to the figure below.

Slip Tendency Plot



e. Verify that the surfaces in the 3D viewer appear to be colored similar to the figure below.

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f. Select the Options button on the 3D Fault Viewer window and select the Browse Data button. Verify that the values in the Browse Data window match the following values.

```
#Created by: @(#)3dstress 09-30-96 Rev 1.2
#Date: Mon Oct 7 16:51:02 1996
```

```
#Generated by: 3D Fault Viewer
```

	Mag	Dir	Plng
SX	40	15	90
SY	30	15	0
SZ	10	105	0

```
X-Y-Z-Slip_Tendency-Slip_AZ-Slip_Plng
```

```
-----
```

```
File Name: tc1.vbl
```

```
-----
```

```
0.000000 0.000000 0.000000 0.000000 15.000000 0.000000
10.000000 0.000000 0.000000 NULL NULL NULL
10.000000 10.000000 0.000000 NULL NULL NULL
0.000000 0.000000 0.000000 0.000000 15.000000 0.000000
10.000000 10.000000 0.000000 NULL NULL NULL
0.000000 10.000000 0.000000 NULL NULL NULL
```

```
-----
```

```
File Name: tc2.vbl
```

```
-----
```

```
0.000000 0.000000 0.000000 0.440927 0.000005 0.000001
0.000000 10.000000 0.000000 NULL NULL NULL
0.000000 10.000000 10.000000 NULL NULL NULL
0.000000 0.000000 0.000000 0.440927 0.000005 0.000001
0.000000 10.000000 10.000000 NULL NULL NULL
0.000000 0.000000 10.000000 NULL NULL NULL
```

```
-----
```

```
File Name: tc3.vbl
```

```
-----
```

```
0.000000 0.000000 0.000000 0.638988 247.252731 42.979954
10.000000 10.000000 0.000000 NULL NULL NULL
15.000000 10.000000 8.700000 NULL NULL NULL
0.000000 0.000000 0.000000 0.638988 247.252731 42.979954
15.000000 10.000000 8.700000 NULL NULL NULL
5.000000 0.000000 8.700000 NULL NULL NULL
```

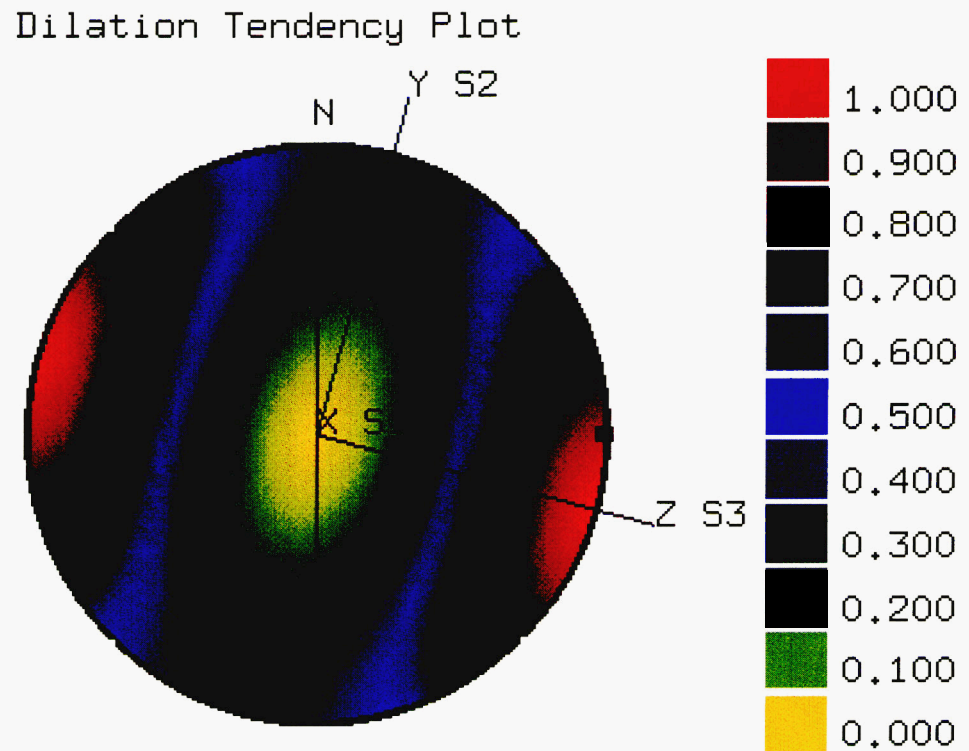
```
-----
```

```
File Name: tc4.vbl
```

```
-----
```

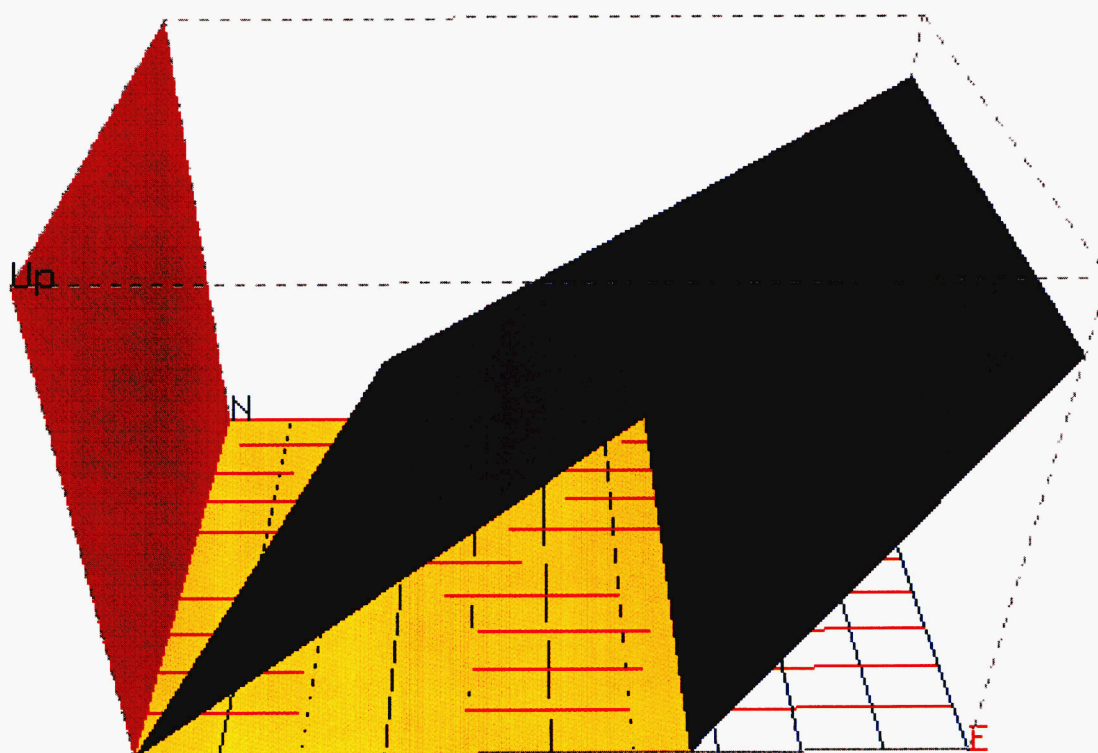
```
10.000000 0.000000 0.000000 0.710823 305.093628 54.915829
10.000000 10.000000 0.000000 NULL NULL NULL
15.000000 10.000000 8.700000 NULL NULL NULL
10.000000 0.000000 0.000000 0.710823 305.093628 54.915829
15.000000 10.000000 8.700000 NULL NULL NULL
15.000000 0.000000 8.700000 NULL NULL NULL
```

- h. Using the Options button, select the Compute Dilation Tendency button.
- i. Verify that the Tendency Plot viewer appears to be colored similar to the figure below.



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j. Verify that the surfaces in the 3D viewer appear to be colored similar to the figure below.



k. Select the Options button on the 3D Fault Viewer window and select the Browse Data button. Verify that the values in the Browse Data window match the following values.

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```
#Created by: @(#)3dstress 09-30-96 Rev 1.2
#Date: Mon Oct  7 16:58:46 1996
```

```
#Generated by: 3D Fault Viewer
```

	Mag	Dir	Plng
SX	40	15	90
SY	30	15	0
SZ	10	105	0

```
X-Y-Z-Dilation_Tendency
```

```
-----
```

```
File Name: /pscr0/brent2/dvrDir_961007/961003dir/tc1.vbl
```

```
-----
```

0.000000	0.000000	0.000000	0.000000
10.000000	0.000000	0.000000	NULL
10.000000	10.000000	0.000000	NULL
0.000000	0.000000	0.000000	0.000000
10.000000	10.000000	0.000000	NULL
0.000000	10.000000	0.000000	NULL

```
-----
```

```
File Name: /pscr0/brent2/dvrDir_961007/961003dir/tc2.vbl
```

```
-----
```

0.000000	0.000000	0.000000	0.955342
0.000000	10.000000	0.000000	NULL
0.000000	10.000000	10.000000	NULL
0.000000	0.000000	0.000000	0.955342
0.000000	10.000000	10.000000	NULL
0.000000	0.000000	10.000000	NULL

```
-----
```

```
File Name: /pscr0/brent2/dvrDir_961007/961003dir/tc3.vbl
```

```
-----
```

0.000000	0.000000	0.000000	0.715217
10.000000	10.000000	0.000000	NULL
15.000000	10.000000	8.700000	NULL
0.000000	0.000000	0.000000	0.715217
15.000000	10.000000	8.700000	NULL
5.000000	0.000000	8.700000	NULL

```
-----
```

```
File Name: /pscr0/brent2/dvrDir_961007/961003dir/tc4.vbl
```

```
-----
```

10.000000	0.000000	0.000000	0.718143
10.000000	10.000000	0.000000	NULL
15.000000	10.000000	8.700000	NULL
10.000000	0.000000	0.000000	0.718143
15.000000	10.000000	8.700000	NULL
15.000000	0.000000	8.700000	NULL

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2.5 Display line coverage overlays in 2D viewer window.

- Open the Map viewer window.
- Select the Coverages button on the Map viewer window.
- Select the Load button on the Coverage Tool dialog window.
- Use the file selector dialog window to select a line coverage file to load such as the test file below.

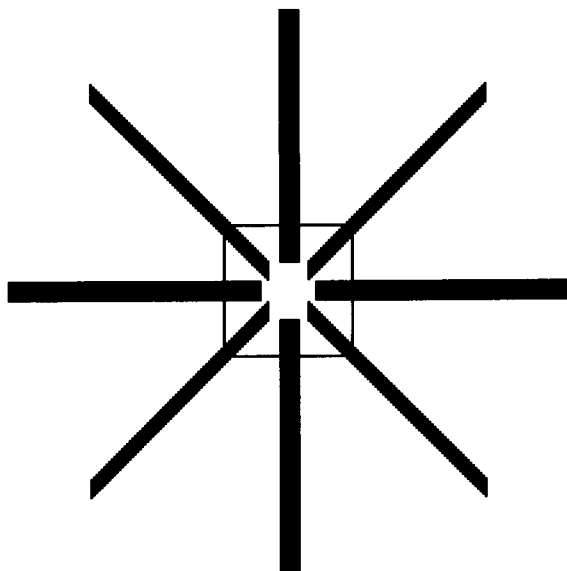
```

100
  0.00      50.00
  0.00     500.00
END
101
 35.36     35.36
353.55    353.55
END
102
 50.00      0.00
500.00      0.00
END
103
 35.36    -35.36
353.55   -353.55
END
104
  0.00    -50.00
  0.00   -500.00
END
105
-35.36    -35.36
-353.55   -353.55
END
106
-50.00      0.00
-500.00      0.00
END
107
-35.36     35.36
-353.55    353.55
END
END

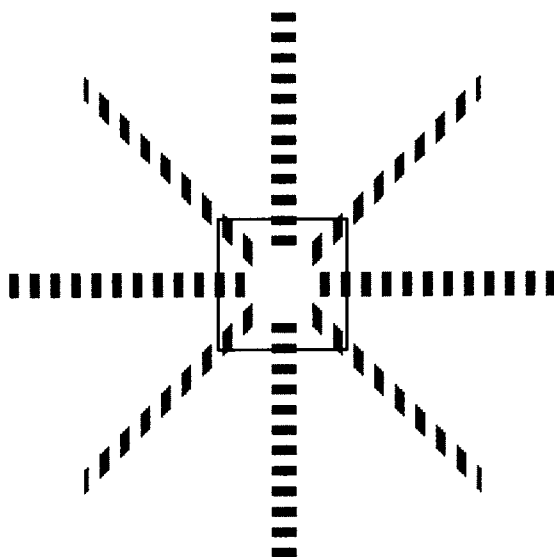
```

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e. Verify that the line coverage displays in the Map Viewer window.



f. Use the Coverage Tool buttons and sliders to modify the color, line style, and line width of the line coverage that is loaded.



2.6 Display computed dilation tendency for a user specified fault surface orientation in the Tendency Plot viewer window.

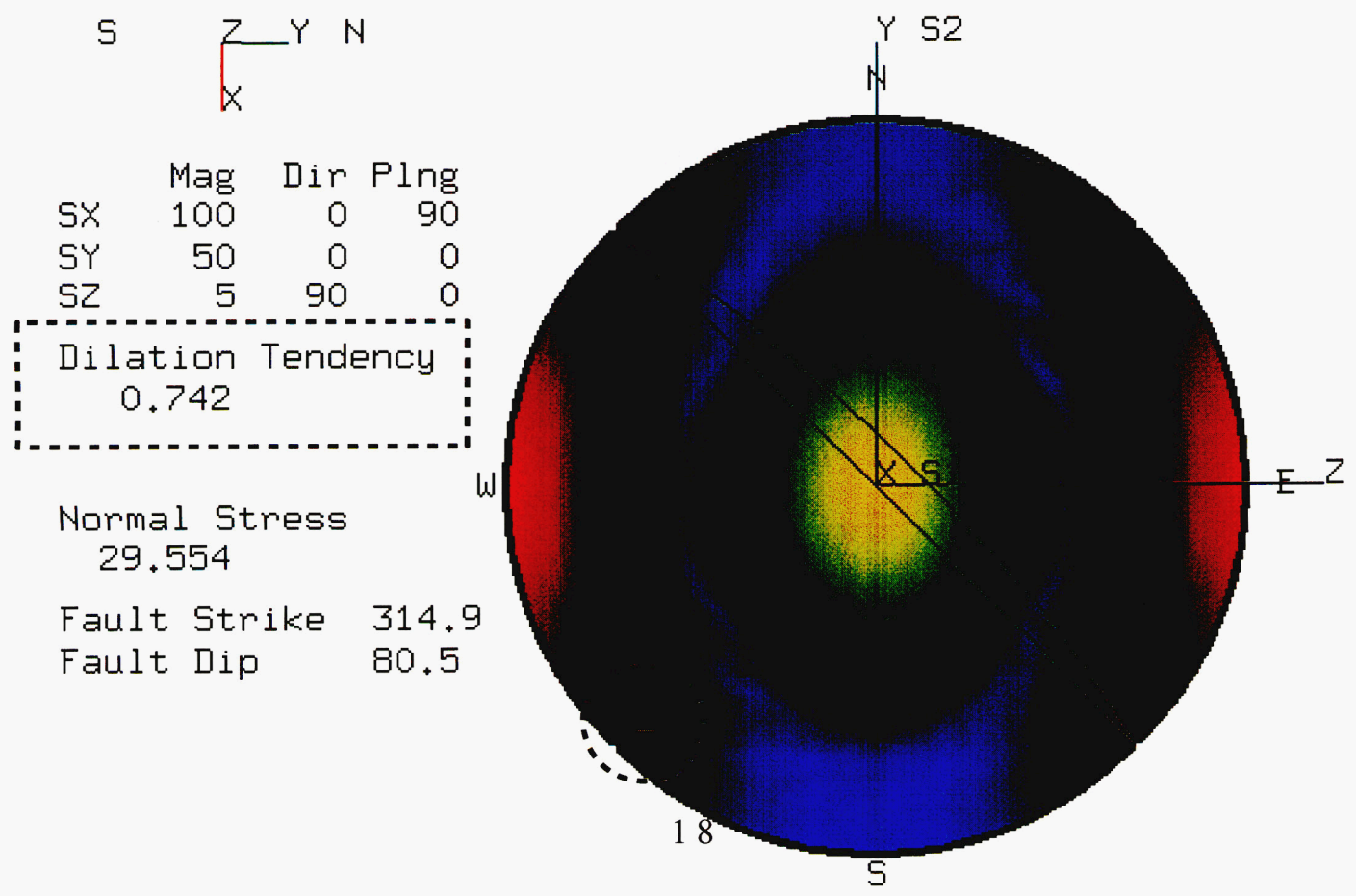
- Open the Tendency Plot, Sliders, and Options windows.
- Select the Compute Dilation Tendency button on the Options window.
- Set the stress magnitudes and orientations in the Sliders windows to the following values:

	Mag	Direction	Plunge
SX	100	0	90
SY	50	0	0
SZ	5	90	0

- Use the left mouse button to set the fault strike and dip in the Tendency Plot window to the following values and verify the dilation tendency display values as follows.

Fault Strike	Fault Dip	Dilation Value
45	30	0.20
135	60	0.57
215	20	0.10
315	80	0.74

Dilation Tendency Plot

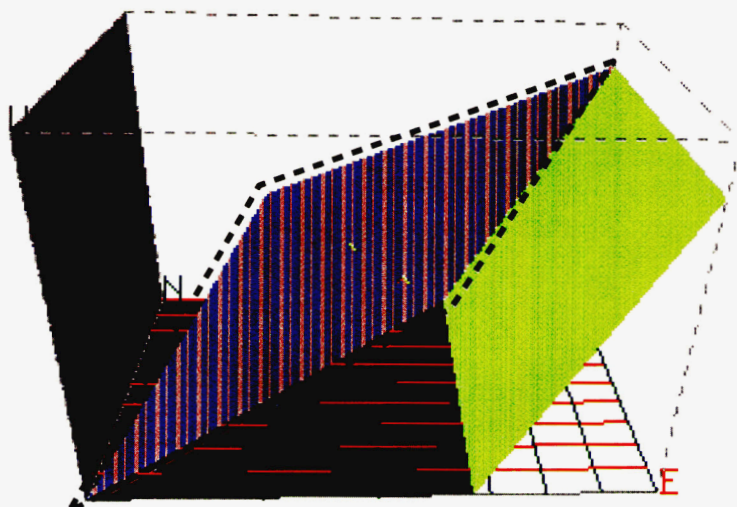


2.7 Highlight polygons of faults in 3D viewer that correspond to orientations selected in the Tendency Plot viewer.

- Open the 3D Fault viewer and Tendency Plot windows.
- Load the following VBL files in the 3D Fault viewer (tc1.vbl, tc2.vbl, tc3.vbl, tc4.vbl) see section 2.4 for a listing of the contents of these files.
- Use the middle mouse button in the Tendency Plot viewer window to set the fault strike and dip values to the following values and verify the highlighted polygons in the 3D Fault viewer window.

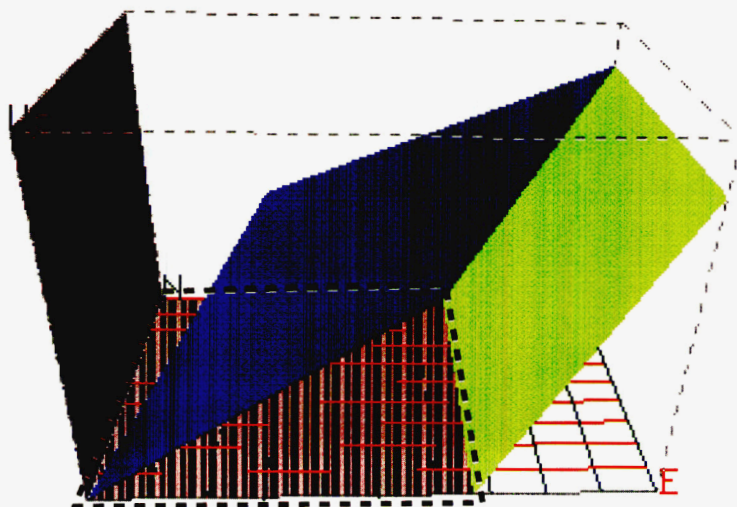
Fault strike 225

Fault dip 68



Fault strike 90

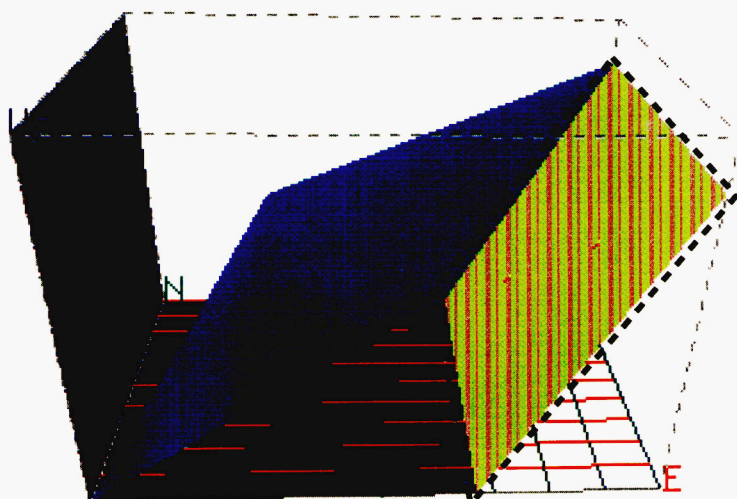
Fault dip 0



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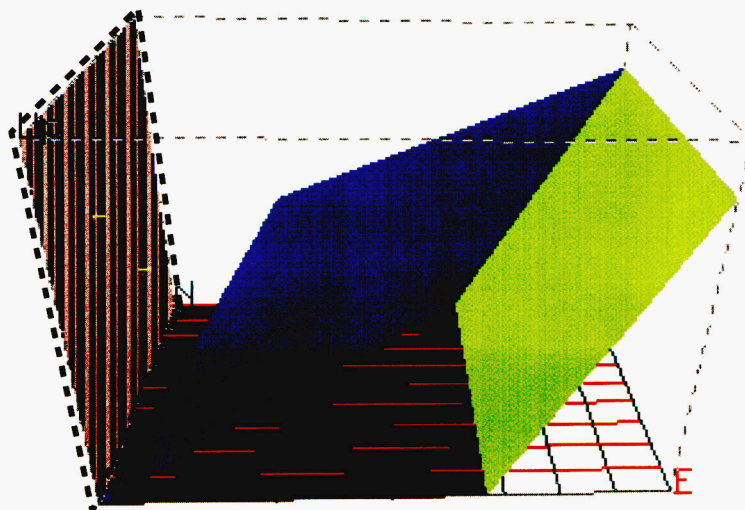
Fault strike 180

Fault dip 60



Fault strike 180

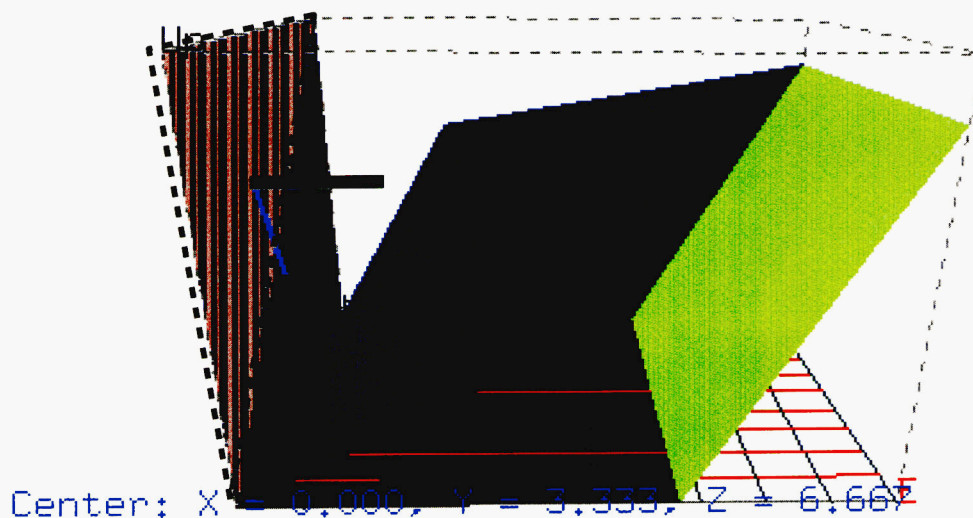
Fault dip 90



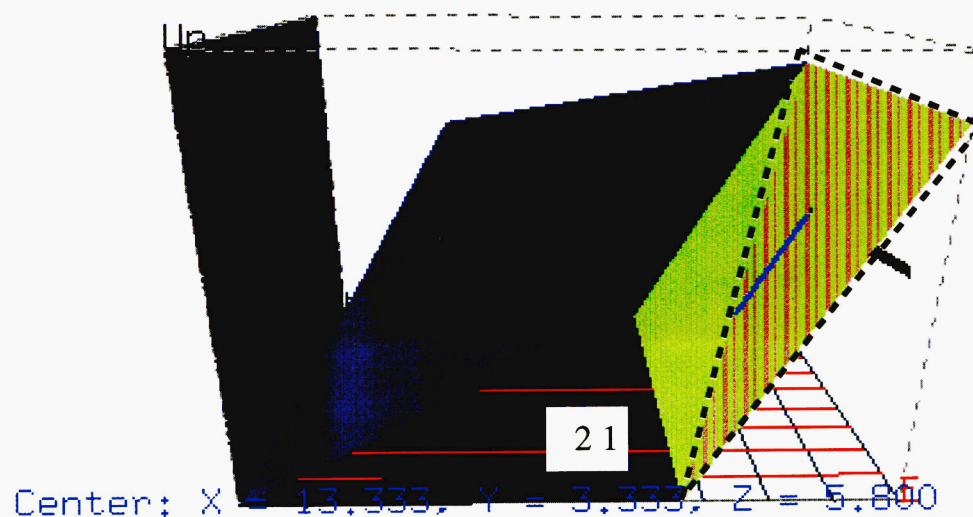
2.8 Display normal and slip direction vectors for selected polygons of faults in the 3D viewer.

- Open the 3D Fault viewer and Tendency Plot windows.
- Load the following VBL files in the 3D Fault viewer (tc1.vbl, tc2.vbl, tc3.vbl, tc4.vbl).
See section 2.4 for a listing of the contents of these files.
- Select the Options button on the 3D Fault viewer window and select the Select Mode On button.
- Pick the following triangles as shown below and verify that the fault strike and dip displayed in the Tendency Plot window match the following figures. The colors of the normal (black) and slip direction (cyan) vectors are controlled using the Options dialog from the 3D Fault viewer window.

Select Mode



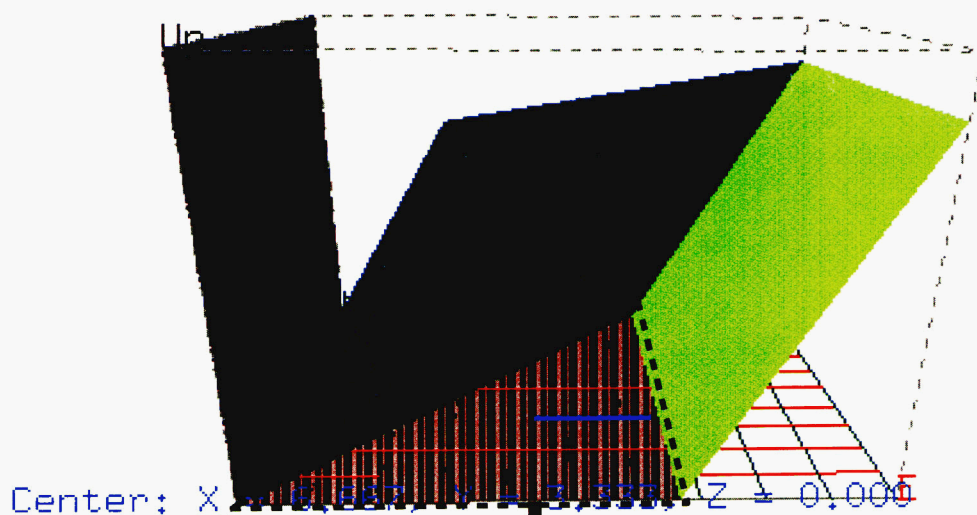
Select Mode



Fault strike 90

Fault dip 0

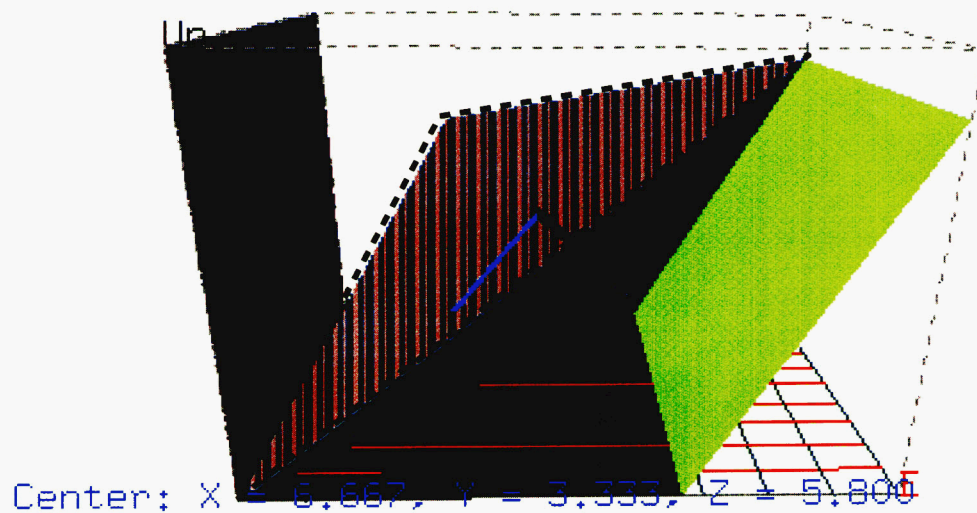
Select Mode



Fault strike 225

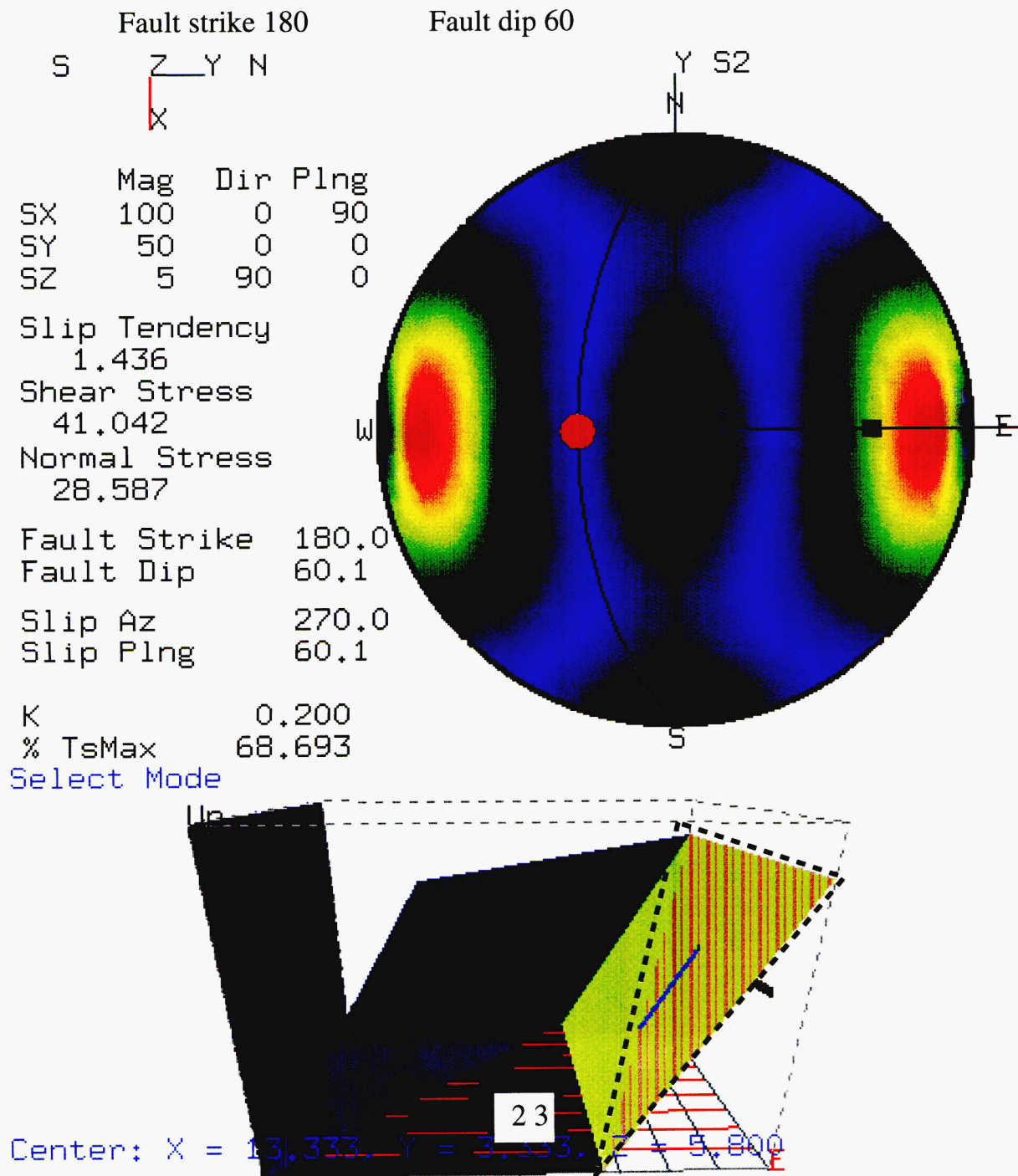
Fault dip 68

Select Mode



2.9 Display the fault surface orientation in the Tendency Plot viewer that corresponds to the orientation of a selected polygon of a fault in the 3D viewer.

- Open the 3D Fault viewer and Tendency Plot windows.
- Load the following VBL files in the 3D Fault viewer (tc1.vbl, tc2.vbl, tc3.vbl, tc4.vbl).
See section 2.4 for a listing of the contents of these files.
- Select the Options button on the 3D Fault viewer window and select the Select Mode On button.
- Pick the following triangles as shown below and verify that the fault strike and dip displayed in the Tendency Plot window match the following figures.



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Fault strike 180

Fault dip 90

	Mag	Dir	Plng
SX	100	0	90
SY	50	0	0
SZ	5	90	0

Slip Tendency
0.000

Shear Stress
0.000

Normal Stress
5.000

Fault Strike 180.0

Fault Dip 90.0

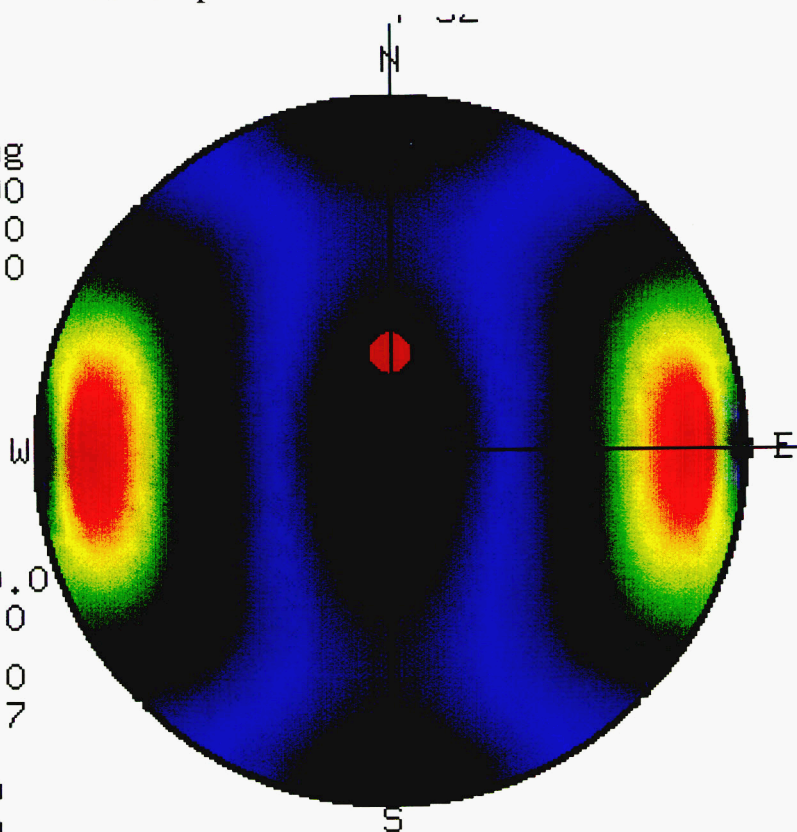
Slip Az 0.0

Slip Plng 64.7

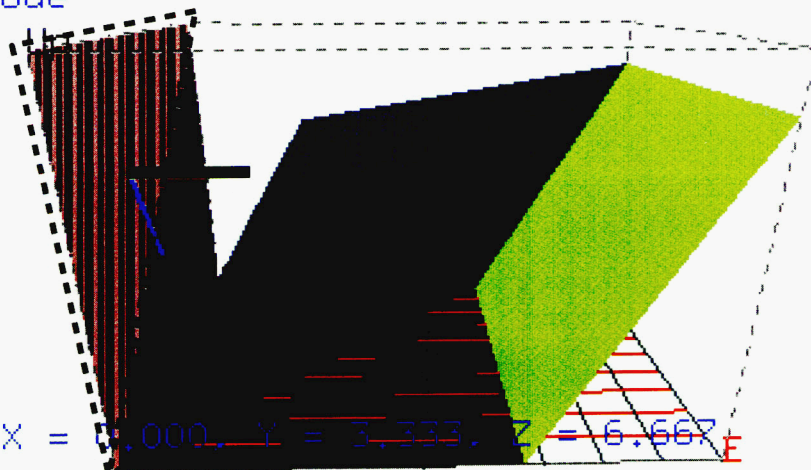
K 0.200

% TsMax 0.000

R 0.526

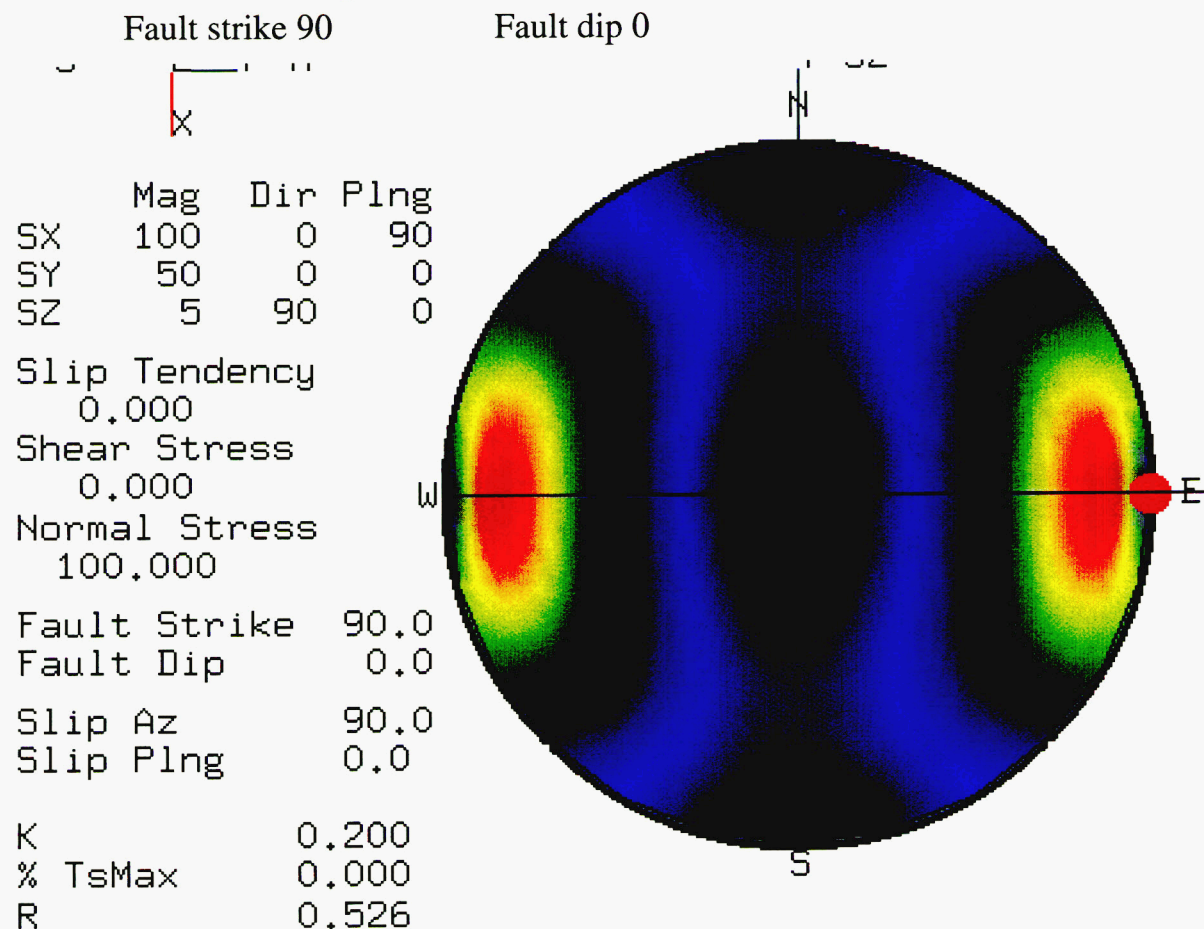


Select Mode

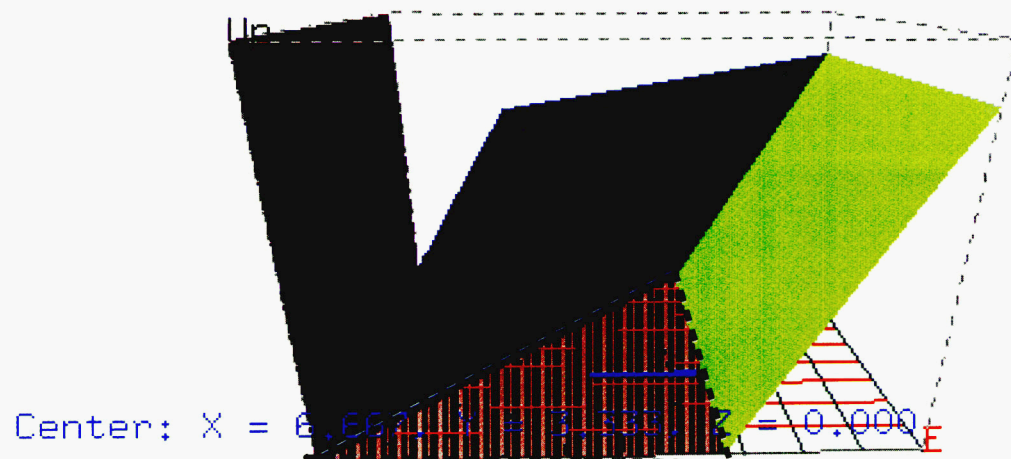


Center: X = 0.000, Y = 3.333, Z = -6.667

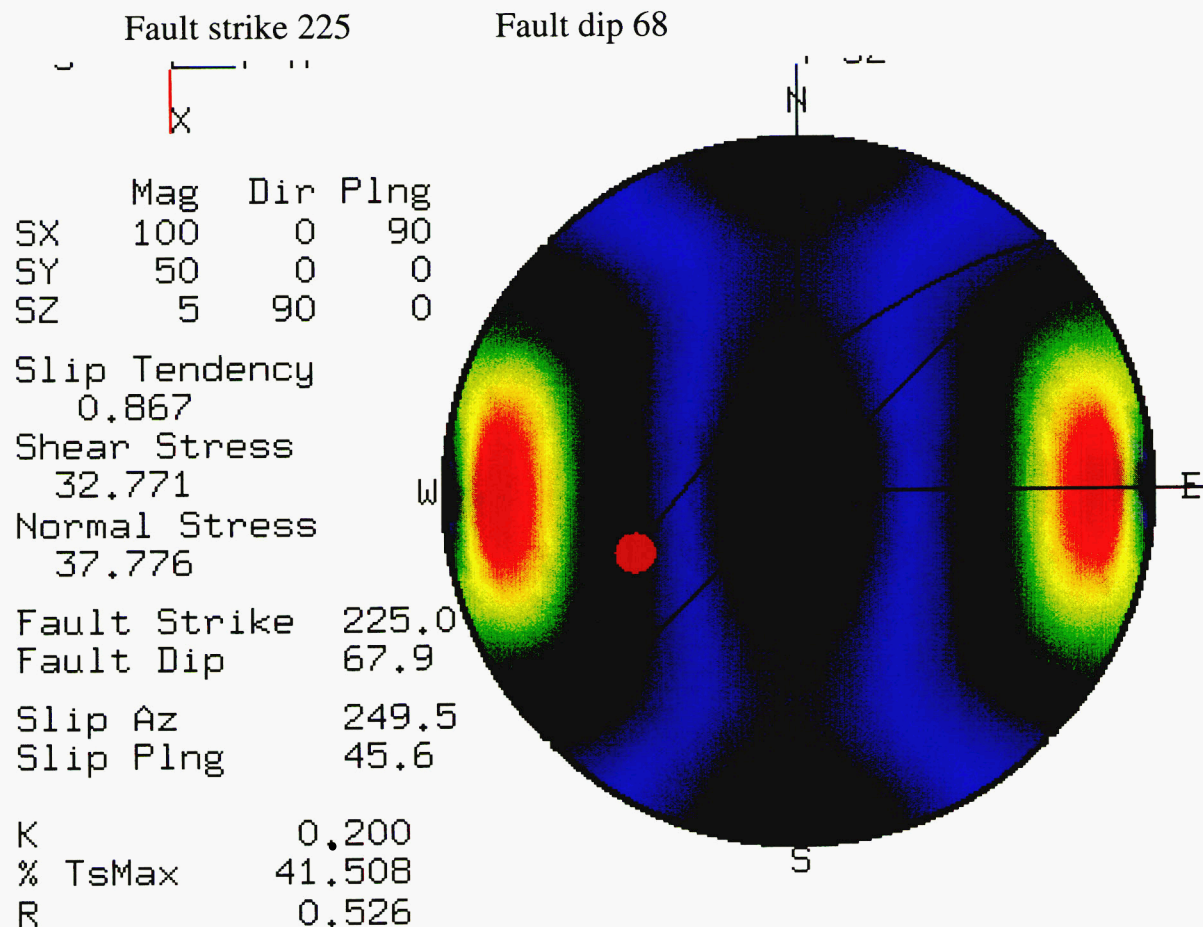
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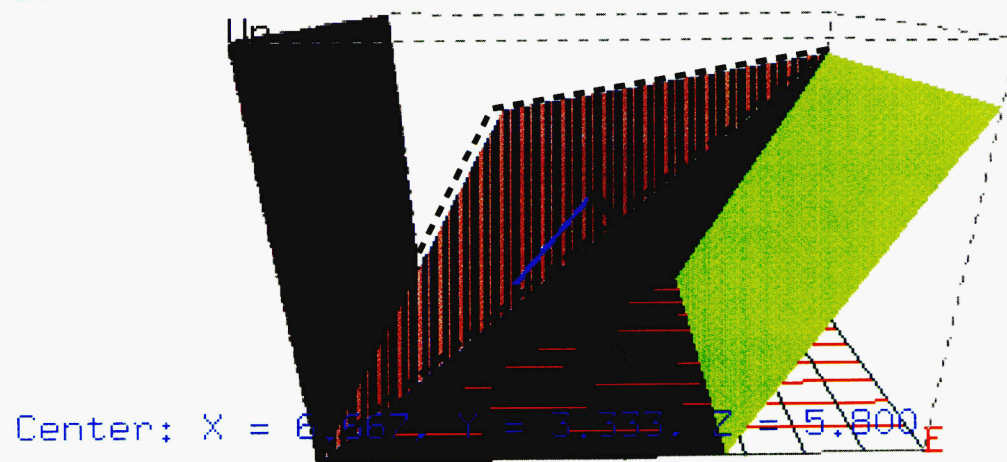
Select Mode



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Select Mode



3. Technical basis for slip and dilation tendency

The equations for computing slip and dilation tendency for a given fault surface using the input 3D stress conditions are given in the 3DStress users manual. The following test procedures are used to verify the correct computation of slip and dilation tendency values.

3.1 Slip tendency computations

a. Execute 3DStress using the command line options as shown in the example below.

```
% 3dstress -s sx sy sz rx ry rz fstrike fdip
```

```
% 3dstress -s 100 50 5 0 0 0 135 70
```

```
sxyz = 100 50 5 rxyz = 0 0 0 flt = 135 70 slip = 294.347 44.0995 sliptend = 0.874458
```

b. Execute 3DStress for the following cases on the next pages and verify the slip vector direction, slip vector plunge, and slip tendency values returned by 3DStress.

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```
# Program: 3dstress.exp:
# 3dstress 09-30-96 Rev 1.2
# Execution date: Tue Oct 8 16:39:48 CDT 1996
# sigmaX sigmaY sigmaZ   rotX rotY rotZ   fltStrike fltDip   slipAzimuth slipPlunge   slipTendency
S 1 50 50 R 0 0 0 F 0 45 SLIP_VECTOR 0 90 SLIPTEND 0.96
S 1 50 50 R 0 0 0 F 45 45 SLIP_VECTOR 0 135 SLIPTEND 0.96
S 1 50 50 R 0 0 45 F 0 45 SLIP_VECTOR 0 26 SLIPTEND 0.56
S 1 50 50 R 0 0 45 F 45 45 SLIP_VECTOR 0 56 SLIPTEND 1.52
S 1 50 50 R 0 45 0 F 0 45 SLIP_VECTOR 0 180 SLIPTEND 0.00
S 1 50 50 R 0 45 0 F 45 45 SLIP_VECTOR 0 213 SLIPTEND 1.52
S 1 50 50 R 0 45 45 F 0 45 SLIP_VECTOR 0 168 SLIPTEND 1.52
S 1 50 50 R 0 45 45 F 45 45 SLIP_VECTOR 0 95 SLIPTEND 2.66
S 1 50 50 R 45 0 0 F 0 45 SLIP_VECTOR 0 90 SLIPTEND 0.96
S 1 50 50 R 45 0 0 F 45 45 SLIP_VECTOR 0 135 SLIPTEND 0.96
S 1 50 50 R 45 0 45 F 0 45 SLIP_VECTOR 0 50 SLIPTEND 0.15
S 1 50 50 R 45 0 45 F 45 45 SLIP_VECTOR 0 71 SLIPTEND 0.56
S 1 50 50 R 45 45 0 F 0 45 SLIP_VECTOR 0 11 SLIPTEND 1.52
S 1 50 50 R 45 45 0 F 45 45 SLIP_VECTOR 0 225 SLIPTEND 0.00
S 1 50 50 R 45 45 45 F 0 45 SLIP_VECTOR 0 11 SLIPTEND 0.50
S 1 50 50 R 45 45 45 F 45 45 SLIP_VECTOR 0 213 SLIPTEND 1.52
S 1 50 99 R 0 0 0 F 0 45 SLIP_VECTOR 0 90 SLIPTEND 0.98
S 1 50 99 R 0 0 0 F 45 45 SLIP_VECTOR 0 101 SLIPTEND 1.08
S 1 50 99 R 0 0 45 F 0 45 SLIP_VECTOR 0 56 SLIPTEND 0.65
S 1 50 99 R 0 0 45 F 45 45 SLIP_VECTOR 0 63 SLIPTEND 1.60
S 1 50 99 R 0 45 0 F 0 45 SLIP_VECTOR 0 180 SLIPTEND 0.00
S 1 50 99 R 0 45 0 F 45 45 SLIP_VECTOR 0 225 SLIPTEND 1.60
S 1 50 99 R 0 45 45 F 0 45 SLIP_VECTOR 0 180 SLIPTEND 1.60
S 1 50 99 R 0 45 45 F 45 45 SLIP_VECTOR 0 80 SLIPTEND 3.00
S 1 50 99 R 45 0 0 F 0 45 SLIP_VECTOR 0 123 SLIPTEND 1.08
S 1 50 99 R 45 0 0 F 45 45 SLIP_VECTOR 0 135 SLIPTEND 0.98
S 1 50 99 R 45 0 45 F 0 45 SLIP_VECTOR 0 136 SLIPTEND 0.37
S 1 50 99 R 45 0 45 F 45 45 SLIP_VECTOR 0 101 SLIPTEND 0.65
S 1 50 99 R 45 45 0 F 0 45 SLIP_VECTOR 0 180 SLIPTEND 1.60
S 1 50 99 R 45 45 0 F 45 45 SLIP_VECTOR 0 225 SLIPTEND 0.00
S 1 50 99 R 45 45 45 F 0 45 SLIP_VECTOR 0 35 SLIPTEND 0.57
S 1 50 99 R 45 45 45 F 45 45 SLIP_VECTOR 0 225 SLIPTEND 1.60
S 1 99 50 R 0 0 0 F 0 45 SLIP_VECTOR 0 90 SLIPTEND 0.96
S 1 99 50 R 0 0 0 F 45 45 SLIP_VECTOR 0 168 SLIPTEND 1.08
S 1 99 50 R 0 0 45 F 0 45 SLIP_VECTOR 0 180 SLIPTEND 0.69
S 1 99 50 R 0 0 45 F 45 45 SLIP_VECTOR 0 225 SLIPTEND 1.60
S 1 99 50 R 0 45 0 F 0 45 SLIP_VECTOR 0 180 SLIPTEND 0.00
S 1 99 50 R 0 45 0 F 45 45 SLIP_VECTOR 0 206 SLIPTEND 1.60
S 1 99 50 R 0 45 45 F 0 45 SLIP_VECTOR 0 161 SLIPTEND 1.60
S 1 99 50 R 0 45 45 F 45 45 SLIP_VECTOR 0 120 SLIPTEND 2.94
S 1 99 50 R 45 0 0 F 0 45 SLIP_VECTOR 0 56 SLIPTEND 1.08
S 1 99 50 R 45 0 0 F 45 45 SLIP_VECTOR 0 135 SLIPTEND 0.96
S 1 99 50 R 45 0 45 F 0 45 SLIP_VECTOR 0 180 SLIPTEND 0.29
S 1 99 50 R 45 0 45 F 45 45 SLIP_VECTOR 0 225 SLIPTEND 0.69
S 1 99 50 R 45 45 0 F 0 45 SLIP_VECTOR 0 18 SLIPTEND 1.60
S 1 99 50 R 45 45 0 F 45 45 SLIP_VECTOR 0 225 SLIPTEND 0.00
S 1 99 50 R 45 45 45 F 0 45 SLIP_VECTOR 0 179 SLIPTEND 0.53
S 1 99 50 R 45 45 45 F 45 45 SLIP_VECTOR 0 206 SLIPTEND 1.60
S 1 99 99 R 0 0 0 F 0 45 SLIP_VECTOR 0 90 SLIPTEND 0.98
S 1 99 99 R 0 0 0 F 45 45 SLIP_VECTOR 0 135 SLIPTEND 0.98
S 1 99 99 R 0 0 45 F 0 45 SLIP_VECTOR 0 26 SLIPTEND 0.57
S 1 99 99 R 0 0 45 F 45 45 SLIP_VECTOR 0 56 SLIPTEND 1.58
S 1 99 99 R 0 45 0 F 0 45 SLIP_VECTOR 0 180 SLIPTEND 0.00
S 1 99 99 R 0 45 0 F 45 45 SLIP_VECTOR 0 213 SLIPTEND 1.58
S 1 99 99 R 0 45 45 F 0 45 SLIP_VECTOR 0 168 SLIPTEND 1.58
S 1 99 99 R 0 45 45 F 45 45 SLIP_VECTOR 0 95 SLIPTEND 2.95
S 1 99 99 R 45 0 0 F 0 45 SLIP_VECTOR 0 90 SLIPTEND 0.98
S 1 99 99 R 45 0 0 F 45 45 SLIP_VECTOR 0 135 SLIPTEND 0.98
S 1 99 99 R 45 0 45 F 0 45 SLIP_VECTOR 0 50 SLIPTEND 0.15
S 1 99 99 R 45 0 45 F 45 45 SLIP_VECTOR 0 71 SLIPTEND 0.57
S 1 99 99 R 45 45 0 F 0 45 SLIP_VECTOR 0 11 SLIPTEND 1.58
S 1 99 99 R 45 45 0 F 45 45 SLIP_VECTOR 0 225 SLIPTEND 0.00
S 1 99 99 R 45 45 45 F 0 45 SLIP_VECTOR 0 11 SLIPTEND 0.51
S 1 99 99 R 45 45 45 F 45 45 SLIP_VECTOR 0 213 SLIPTEND 1.58
```

S	50	1	1	R	0	0	0	F	0	45	SLIP_VECTOR	0	90	SLIPTEND	0.96
S	50	1	1	R	0	0	0	F	45	45	SLIP_VECTOR	0	135	SLIPTEND	0.96
S	50	1	1	R	0	0	45	F	0	45	SLIP_VECTOR	0	26	SLIPTEND	1.60
S	50	1	1	R	0	0	45	F	45	45	SLIP_VECTOR	0	56	SLIPTEND	0.59
S	50	1	1	R	0	45	0	F	0	45	SLIP_VECTOR	0	0	SLIPTEND	0.00
S	50	1	1	R	0	45	0	F	45	45	SLIP_VECTOR	0	213	SLIPTEND	0.59
S	50	1	1	R	0	45	45	F	0	45	SLIP_VECTOR	0	168	SLIPTEND	0.59
S	50	1	1	R	0	45	45	F	45	45	SLIP_VECTOR	0	95	SLIPTEND	0.30
S	50	1	1	R	45	0	0	F	0	45	SLIP_VECTOR	0	90	SLIPTEND	0.96
S	50	1	1	R	45	0	0	F	45	45	SLIP_VECTOR	0	135	SLIPTEND	0.96
S	50	1	1	R	45	0	45	F	0	45	SLIP_VECTOR	0	50	SLIPTEND	3.46
S	50	1	1	R	45	0	45	F	45	45	SLIP_VECTOR	0	71	SLIPTEND	1.60
S	50	1	1	R	45	45	0	F	0	45	SLIP_VECTOR	0	11	SLIPTEND	0.59
S	50	1	1	R	45	45	0	F	45	45	SLIP_VECTOR	0	225	SLIPTEND	0.00
S	50	1	1	R	45	45	45	F	0	45	SLIP_VECTOR	0	11	SLIPTEND	1.77
S	50	1	1	R	45	45	45	F	45	45	SLIP_VECTOR	0	213	SLIPTEND	0.59
S	50	1	99	R	0	0	0	F	0	45	SLIP_VECTOR	0	90	SLIPTEND	0.33
S	50	1	99	R	0	0	0	F	45	45	SLIP_VECTOR	0	225	SLIPTEND	0.69
S	50	1	99	R	0	0	45	F	0	45	SLIP_VECTOR	0	123	SLIPTEND	0.65
S	50	1	99	R	0	0	45	F	45	45	SLIP_VECTOR	0	88	SLIPTEND	0.37
S	50	1	99	R	0	45	0	F	0	45	SLIP_VECTOR	0	0	SLIPTEND	0.00
S	50	1	99	R	0	45	0	F	45	45	SLIP_VECTOR	0	181	SLIPTEND	0.59
S	50	1	99	R	0	45	45	F	0	45	SLIP_VECTOR	0	136	SLIPTEND	0.59
S	50	1	99	R	0	45	45	F	45	45	SLIP_VECTOR	0	223	SLIPTEND	0.27
S	50	1	99	R	45	0	0	F	0	45	SLIP_VECTOR	0	0	SLIPTEND	0.69
S	50	1	99	R	45	0	0	F	45	45	SLIP_VECTOR	0	135	SLIPTEND	0.33
S	50	1	99	R	45	0	45	F	0	45	SLIP_VECTOR	0	161	SLIPTEND	1.60
S	50	1	99	R	45	0	45	F	45	45	SLIP_VECTOR	0	168	SLIPTEND	0.65
S	50	1	99	R	45	45	0	F	0	45	SLIP_VECTOR	0	43	SLIPTEND	0.59
S	50	1	99	R	45	45	0	F	45	45	SLIP_VECTOR	0	45	SLIPTEND	0.00
S	50	1	99	R	45	45	45	F	0	45	SLIP_VECTOR	0	150	SLIPTEND	1.66
S	50	1	99	R	45	45	45	F	45	45	SLIP_VECTOR	0	181	SLIPTEND	0.59
S	50	99	1	R	0	0	0	F	0	45	SLIP_VECTOR	0	90	SLIPTEND	0.96
S	50	99	1	R	0	0	0	F	45	45	SLIP_VECTOR	0	45	SLIPTEND	0.69
S	50	99	1	R	0	0	45	F	0	45	SLIP_VECTOR	0	123	SLIPTEND	1.08
S	50	99	1	R	0	0	45	F	45	45	SLIP_VECTOR	0	88	SLIPTEND	0.59
S	50	99	1	R	0	45	0	F	0	45	SLIP_VECTOR	0	180	SLIPTEND	0.00
S	50	99	1	R	0	45	0	F	45	45	SLIP_VECTOR	0	181	SLIPTEND	0.37
S	50	99	1	R	0	45	45	F	0	45	SLIP_VECTOR	0	136	SLIPTEND	0.37
S	50	99	1	R	0	45	45	F	45	45	SLIP_VECTOR	0	223	SLIPTEND	0.29
S	50	99	1	R	45	0	0	F	0	45	SLIP_VECTOR	0	180	SLIPTEND	0.69
S	50	99	1	R	45	0	0	F	45	45	SLIP_VECTOR	0	135	SLIPTEND	0.96
S	50	99	1	R	45	0	45	F	0	45	SLIP_VECTOR	0	161	SLIPTEND	0.58
S	50	99	1	R	45	0	45	F	45	45	SLIP_VECTOR	0	168	SLIPTEND	1.08
S	50	99	1	R	45	45	0	F	0	45	SLIP_VECTOR	0	43	SLIPTEND	0.37
S	50	99	1	R	45	45	0	F	45	45	SLIP_VECTOR	0	45	SLIPTEND	0.00
S	50	99	1	R	45	45	45	F	0	45	SLIP_VECTOR	0	150	SLIPTEND	0.35
S	50	99	1	R	45	45	45	F	45	45	SLIP_VECTOR	0	181	SLIPTEND	0.37
S	50	99	99	R	0	0	0	F	0	45	SLIP_VECTOR	0	90	SLIPTEND	0.33
S	50	99	99	R	0	0	0	F	45	45	SLIP_VECTOR	0	135	SLIPTEND	0.33
S	50	99	99	R	0	0	45	F	0	45	SLIP_VECTOR	0	26	SLIPTEND	0.24
S	50	99	99	R	0	0	45	F	45	45	SLIP_VECTOR	0	56	SLIPTEND	0.34
S	50	99	99	R	0	45	0	F	0	45	SLIP_VECTOR	0	180	SLIPTEND	0.00
S	50	99	99	R	0	45	0	F	45	45	SLIP_VECTOR	0	213	SLIPTEND	0.34
S	50	99	99	R	0	45	45	F	0	45	SLIP_VECTOR	0	168	SLIPTEND	0.34
S	50	99	99	R	0	45	45	F	45	45	SLIP_VECTOR	0	95	SLIPTEND	0.25
S	50	99	99	R	45	0	0	F	0	45	SLIP_VECTOR	0	90	SLIPTEND	0.33
S	50	99	99	R	45	0	0	F	45	45	SLIP_VECTOR	0	135	SLIPTEND	0.33
S	50	99	99	R	45	0	45	F	0	45	SLIP_VECTOR	0	50	SLIPTEND	0.07
S	50	99	99	R	45	0	45	F	45	45	SLIP_VECTOR	0	71	SLIPTEND	0.24
S	50	99	99	R	45	45	0	F	0	45	SLIP_VECTOR	0	11	SLIPTEND	0.34
S	50	99	99	R	45	45	0	F	45	45	SLIP_VECTOR	0	225	SLIPTEND	0.00
S	50	99	99	R	45	45	45	F	0	45	SLIP_VECTOR	0	11	SLIPTEND	0.22
S	50	99	99	R	45	45	45	F	45	45	SLIP_VECTOR	0	213	SLIPTEND	0.34

S 99 1 1 R 0 0 0 F 0 45	SLIP_VECTOR 0 90	SLIPTEND 0.98
S 99 1 1 R 0 0 0 F 45 45	SLIP_VECTOR 0 135	SLIPTEND 0.98
S 99 1 1 R 0 0 45 F 0 45	SLIP_VECTOR 0 26	SLIPTEND 1.66
S 99 1 1 R 0 0 45 F 45 45	SLIP_VECTOR 0 56	SLIPTEND 0.60
S 99 1 1 R 0 45 0 F 0 45	SLIP_VECTOR 0 0	SLIPTEND 0.00
S 99 1 1 R 0 45 0 F 45 45	SLIP_VECTOR 0 213	SLIPTEND 0.60
S 99 1 1 R 0 45 45 F 0 45	SLIP_VECTOR 0 168	SLIPTEND 0.60
S 99 1 1 R 0 45 45 F 45 45	SLIP_VECTOR 0 95	SLIPTEND 0.30
S 99 1 1 R 45 0 0 F 0 45	SLIP_VECTOR 0 90	SLIPTEND 0.98
S 99 1 1 R 45 0 0 F 45 45	SLIP_VECTOR 0 135	SLIPTEND 0.98
S 99 1 1 R 45 0 45 F 0 45	SLIP_VECTOR 0 50	SLIPTEND 4.58
S 99 1 1 R 45 0 45 F 45 45	SLIP_VECTOR 0 71	SLIPTEND 1.66
S 99 1 1 R 45 45 0 F 0 45	SLIP_VECTOR 0 11	SLIPTEND 0.60
S 99 1 1 R 45 45 0 F 45 45	SLIP_VECTOR 0 225	SLIPTEND 0.00
S 99 1 1 R 45 45 45 F 0 45	SLIP_VECTOR 0 11	SLIPTEND 1.86
S 99 1 1 R 45 45 45 F 45 45	SLIP_VECTOR 0 213	SLIPTEND 0.60
S 99 1 50 R 0 0 0 F 0 45	SLIP_VECTOR 0 90	SLIPTEND 0.33
S 99 1 50 R 0 0 0 F 45 45	SLIP_VECTOR 0 168	SLIPTEND 0.65
S 99 1 50 R 0 0 45 F 0 45	SLIP_VECTOR 0 180	SLIPTEND 0.69
S 99 1 50 R 0 45 0 F 45 45	SLIP_VECTOR 0 45	SLIPTEND 0.29
S 99 1 50 R 0 45 0 F 0 45	SLIP_VECTOR 0 0	SLIPTEND 0.00
S 99 1 50 R 0 45 0 F 45 45	SLIP_VECTOR 0 206	SLIPTEND 0.58
S 99 1 50 R 0 45 45 F 0 45	SLIP_VECTOR 0 161	SLIPTEND 0.58
S 99 1 50 R 0 45 45 F 45 45	SLIP_VECTOR 0 120	SLIPTEND 0.19
S 99 1 50 R 45 0 0 F 0 45	SLIP_VECTOR 0 56	SLIPTEND 0.65
S 99 1 50 R 45 0 0 F 45 45	SLIP_VECTOR 0 135	SLIPTEND 0.33
S 99 1 50 R 45 0 45 F 0 45	SLIP_VECTOR 0 360	SLIPTEND 1.60
S 99 1 50 R 45 0 45 F 45 45	SLIP_VECTOR 0 225	SLIPTEND 0.69
S 99 1 50 R 45 45 0 F 0 45	SLIP_VECTOR 0 18	SLIPTEND 0.58
S 99 1 50 R 45 45 0 F 45 45	SLIP_VECTOR 0 225	SLIPTEND 0.00
S 99 1 50 R 45 45 45 F 0 45	SLIP_VECTOR 0 179	SLIPTEND 1.63
S 99 1 50 R 45 45 45 F 45 45	SLIP_VECTOR 0 206	SLIPTEND 0.58
S 99 50 1 R 0 0 0 F 0 45	SLIP_VECTOR 0 90	SLIPTEND 0.98
S 99 50 1 R 0 0 0 F 45 45	SLIP_VECTOR 0 101	SLIPTEND 0.65
S 99 50 1 R 0 0 45 F 0 45	SLIP_VECTOR 0 56	SLIPTEND 1.08
S 99 50 1 R 0 0 45 F 45 45	SLIP_VECTOR 0 63	SLIPTEND 0.58
S 99 50 1 R 0 45 0 F 0 45	SLIP_VECTOR 0 0	SLIPTEND 0.00
S 99 50 1 R 0 45 0 F 45 45	SLIP_VECTOR 0 225	SLIPTEND 0.29
S 99 50 1 R 0 45 45 F 0 45	SLIP_VECTOR 0 360	SLIPTEND 0.29
S 99 50 1 R 0 45 45 F 45 45	SLIP_VECTOR 0 80	SLIPTEND 0.27
S 99 50 1 R 45 0 0 F 0 45	SLIP_VECTOR 0 123	SLIPTEND 0.65
S 99 50 1 R 45 0 0 F 45 45	SLIP_VECTOR 0 135	SLIPTEND 0.98
S 99 50 1 R 45 0 45 F 0 45	SLIP_VECTOR 0 136	SLIPTEND 0.59
S 99 50 1 R 45 0 45 F 45 45	SLIP_VECTOR 0 101	SLIPTEND 1.08
S 99 50 1 R 45 45 0 F 0 45	SLIP_VECTOR 0 360	SLIPTEND 0.29
S 99 50 1 R 45 45 0 F 45 45	SLIP_VECTOR 0 225	SLIPTEND 0.00
S 99 50 1 R 45 45 45 F 0 45	SLIP_VECTOR 0 35	SLIPTEND 0.43
S 99 50 1 R 45 45 45 F 45 45	SLIP_VECTOR 0 45	SLIPTEND 0.29
S 99 50 50 R 0 0 0 F 0 45	SLIP_VECTOR 0 90	SLIPTEND 0.33
S 99 50 50 R 0 0 0 F 45 45	SLIP_VECTOR 0 135	SLIPTEND 0.33
S 99 50 50 R 0 0 45 F 0 45	SLIP_VECTOR 0 26	SLIPTEND 0.34
S 99 50 50 R 0 0 45 F 45 45	SLIP_VECTOR 0 56	SLIPTEND 0.25
S 99 50 50 R 0 45 0 F 0 45	SLIP_VECTOR 0 0	SLIPTEND 0.00
S 99 50 50 R 0 45 0 F 45 45	SLIP_VECTOR 0 213	SLIPTEND 0.25
S 99 50 50 R 0 45 45 F 0 45	SLIP_VECTOR 0 168	SLIPTEND 0.25
S 99 50 50 R 0 45 45 F 45 45	SLIP_VECTOR 0 95	SLIPTEND 0.14
S 99 50 50 R 45 0 0 F 0 45	SLIP_VECTOR 0 90	SLIPTEND 0.33
S 99 50 50 R 45 0 0 F 45 45	SLIP_VECTOR 0 135	SLIPTEND 0.33
S 99 50 50 R 45 0 45 F 0 45	SLIP_VECTOR 0 50	SLIPTEND 0.14
S 99 50 50 R 45 0 45 F 45 45	SLIP_VECTOR 0 71	SLIPTEND 0.34
S 99 50 50 R 45 45 0 F 0 45	SLIP_VECTOR 0 11	SLIPTEND 0.25
S 99 50 50 R 45 45 0 F 45 45	SLIP_VECTOR 0 225	SLIPTEND 0.00
S 99 50 50 R 45 45 45 F 0 45	SLIP_VECTOR 0 11	SLIPTEND 0.33
S 99 50 50 R 45 45 45 F 45 45	SLIP_VECTOR 0 213	SLIPTEND 0.25

3.2 Dilation tendency computations

- a. Execute 3DStress using the command line options as shown in the example below.

```
% 3dstress -d  sx sy sz  rx ry rz  fstrike fdip
```

```
% 3dstress -d  100 50 5  0 0 0  135 70
```

```
sxyz = 100 50 5  rxyz = 0 0 0  flt = 135 70  diltend = 0.673885
```

- b. Execute 3DStress for the following cases on the next pages and verify the dilation tendency values returned by 3DStress.

```

# Program: 3dstress.exp:
# 3dstress 09-30-96 Rev 1.2
# Execution date: Tue Oct 8 16:40:05 CDT 1996
# sigmaX sigmaY sigmaZ  rotX rotY rotZ  fltStrike fltDip  dilationTend
S 1 50 50 R 0 0 0 F 0 45 DILTEND 0.50
S 1 50 50 R 0 0 0 F 45 45 DILTEND 0.50
S 1 50 50 R 0 0 45 F 0 45 DILTEND 0.25
S 1 50 50 R 0 0 45 F 45 45 DILTEND 0.73
S 1 50 50 R 0 45 0 F 0 45 DILTEND 1.00
S 1 50 50 R 0 45 0 F 45 45 DILTEND 0.73
S 1 50 50 R 0 45 45 F 0 45 DILTEND 0.73
S 1 50 50 R 0 45 45 F 45 45 DILTEND 0.92
S 1 50 50 R 45 0 0 F 0 45 DILTEND 0.50
S 1 50 50 R 45 0 0 F 45 45 DILTEND 0.50
S 1 50 50 R 45 0 45 F 0 45 DILTEND 0.02
S 1 50 50 R 45 0 45 F 45 45 DILTEND 0.25
S 1 50 50 R 45 45 0 F 0 45 DILTEND 0.73
S 1 50 50 R 45 45 0 F 45 45 DILTEND 1.00
S 1 50 50 R 45 45 45 F 0 45 DILTEND 0.21
S 1 50 50 R 45 45 45 F 45 45 DILTEND 0.73
S 1 50 99 R 0 0 0 F 0 45 DILTEND 0.50
S 1 50 99 R 0 0 0 F 45 45 DILTEND 0.62
S 1 50 99 R 0 0 45 F 0 45 DILTEND 0.38
S 1 50 99 R 0 0 45 F 45 45 DILTEND 0.74
S 1 50 99 R 0 45 0 F 0 45 DILTEND 1.00
S 1 50 99 R 0 45 0 F 45 45 DILTEND 0.85
S 1 50 99 R 0 45 45 F 0 45 DILTEND 0.85
S 1 50 99 R 0 45 45 F 45 45 DILTEND 0.93
S 1 50 99 R 45 0 0 F 0 45 DILTEND 0.62
S 1 50 99 R 45 0 0 F 45 45 DILTEND 0.50
S 1 50 99 R 45 0 45 F 0 45 DILTEND 0.39
S 1 50 99 R 45 0 45 F 45 45 DILTEND 0.38
S 1 50 99 R 45 45 0 F 0 45 DILTEND 0.85
S 1 50 99 R 45 45 0 F 45 45 DILTEND 1.00
S 1 50 99 R 45 45 45 F 0 45 DILTEND 0.57
S 1 50 99 R 45 45 45 F 45 45 DILTEND 0.85
S 1 99 50 R 0 0 0 F 0 45 DILTEND 0.75
S 1 99 50 R 0 0 0 F 45 45 DILTEND 0.62
S 1 99 50 R 0 0 45 F 0 45 DILTEND 0.50
S 1 99 50 R 0 0 45 F 45 45 DILTEND 0.85
S 1 99 50 R 0 45 0 F 0 45 DILTEND 1.00
S 1 99 50 R 0 45 0 F 45 45 DILTEND 0.74
S 1 99 50 R 0 45 45 F 0 45 DILTEND 0.74
S 1 99 50 R 0 45 45 F 45 45 DILTEND 0.95
S 1 99 50 R 45 0 0 F 0 45 DILTEND 0.62
S 1 99 50 R 45 0 0 F 45 45 DILTEND 0.75
S 1 99 50 R 45 0 45 F 0 45 DILTEND 0.15
S 1 99 50 R 45 0 45 F 45 45 DILTEND 0.50
S 1 99 50 R 45 45 0 F 0 45 DILTEND 0.74
S 1 99 50 R 45 45 0 F 45 45 DILTEND 1.00
S 1 99 50 R 45 45 45 F 0 45 DILTEND 0.24
S 1 99 50 R 45 45 45 F 45 45 DILTEND 0.74
S 1 99 99 R 0 0 0 F 0 45 DILTEND 0.50
S 1 99 99 R 0 0 0 F 45 45 DILTEND 0.50
S 1 99 99 R 0 0 45 F 0 45 DILTEND 0.25
S 1 99 99 R 0 0 45 F 45 45 DILTEND 0.73
S 1 99 99 R 0 45 0 F 0 45 DILTEND 1.00
S 1 99 99 R 0 45 0 F 45 45 DILTEND 0.73
S 1 99 99 R 0 45 45 F 0 45 DILTEND 0.73
S 1 99 99 R 0 45 45 F 45 45 DILTEND 0.92
S 1 99 99 R 45 0 0 F 0 45 DILTEND 0.50
S 1 99 99 R 45 0 0 F 45 45 DILTEND 0.50
S 1 99 99 R 45 0 45 F 0 45 DILTEND 0.02
S 1 99 99 R 45 0 45 F 45 45 DILTEND 0.25
S 1 99 99 R 45 45 0 F 0 45 DILTEND 0.73
S 1 99 99 R 45 45 0 F 45 45 DILTEND 1.00
S 1 99 99 R 45 45 45 F 0 45 DILTEND 0.21
S 1 99 99 R 45 45 45 F 45 45 DILTEND 0.73

```

S 50 1 1 R 0 0 0 F 0 45	DILTEND 0.50
S 50 1 1 R 0 0 0 F 45 45	DILTEND 0.50
S 50 1 1 R 0 0 45 F 0 45	DILTEND 0.75
S 50 1 1 R 0 0 45 F 45 45	DILTEND 0.27
S 50 1 1 R 0 45 0 F 0 45	DILTEND 0.00
S 50 1 1 R 0 45 0 F 45 45	DILTEND 0.27
S 50 1 1 R 0 45 45 F 0 45	DILTEND 0.27
S 50 1 1 R 0 45 45 F 45 45	DILTEND 0.08
S 50 1 1 R 45 0 0 F 0 45	DILTEND 0.50
S 50 1 1 R 45 0 0 F 45 45	DILTEND 0.50
S 50 1 1 R 45 0 45 F 0 45	DILTEND 0.98
S 50 1 1 R 45 0 45 F 45 45	DILTEND 0.75
S 50 1 1 R 45 45 0 F 0 45	DILTEND 0.27
S 50 1 1 R 45 45 0 F 45 45	DILTEND 0.00
S 50 1 1 R 45 45 45 F 0 45	DILTEND 0.79
S 50 1 1 R 45 45 45 F 45 45	DILTEND 0.27
S 50 1 99 R 0 0 0 F 0 45	DILTEND 0.25
S 50 1 99 R 0 0 0 F 45 45	DILTEND 0.50
S 50 1 99 R 0 0 45 F 0 45	DILTEND 0.38
S 50 1 99 R 0 0 45 F 45 45	DILTEND 0.39
S 50 1 99 R 0 45 0 F 0 45	DILTEND 0.50
S 50 1 99 R 0 45 0 F 45 45	DILTEND 0.61
S 50 1 99 R 0 45 45 F 0 45	DILTEND 0.61
S 50 1 99 R 0 45 45 F 45 45	DILTEND 0.48
S 50 1 99 R 45 0 0 F 0 45	DILTEND 0.50
S 50 1 99 R 45 0 0 F 45 45	DILTEND 0.25
S 50 1 99 R 45 0 45 F 0 45	DILTEND 0.74
S 50 1 99 R 45 0 45 F 45 45	DILTEND 0.38
S 50 1 99 R 45 45 0 F 0 45	DILTEND 0.61
S 50 1 99 R 45 45 0 F 45 45	DILTEND 0.50
S 50 1 99 R 45 45 45 F 0 45	DILTEND 0.83
S 50 1 99 R 45 45 45 F 45 45	DILTEND 0.61
S 50 99 1 R 0 0 0 F 0 45	DILTEND 0.75
S 50 99 1 R 0 0 0 F 45 45	DILTEND 0.50
S 50 99 1 R 0 0 45 F 0 45	DILTEND 0.62
S 50 99 1 R 0 0 45 F 45 45	DILTEND 0.61
S 50 99 1 R 0 45 0 F 0 45	DILTEND 0.50
S 50 99 1 R 0 45 0 F 45 45	DILTEND 0.39
S 50 99 1 R 0 45 45 F 0 45	DILTEND 0.39
S 50 99 1 R 0 45 45 F 45 45	DILTEND 0.52
S 50 99 1 R 45 0 0 F 0 45	DILTEND 0.50
S 50 99 1 R 45 0 0 F 45 45	DILTEND 0.75
S 50 99 1 R 45 0 45 F 0 45	DILTEND 0.26
S 50 99 1 R 45 0 45 F 45 45	DILTEND 0.62
S 50 99 1 R 45 45 0 F 0 45	DILTEND 0.39
S 50 99 1 R 45 45 0 F 45 45	DILTEND 0.50
S 50 99 1 R 45 45 45 F 0 45	DILTEND 0.17
S 50 99 1 R 45 45 45 F 45 45	DILTEND 0.39
S 50 99 99 R 0 0 0 F 0 45	DILTEND 0.50
S 50 99 99 R 0 0 0 F 45 45	DILTEND 0.50
S 50 99 99 R 0 0 45 F 0 45	DILTEND 0.25
S 50 99 99 R 0 0 45 F 45 45	DILTEND 0.73
S 50 99 99 R 0 45 0 F 0 45	DILTEND 1.00
S 50 99 99 R 0 45 0 F 45 45	DILTEND 0.73
S 50 99 99 R 0 45 45 F 0 45	DILTEND 0.73
S 50 99 99 R 0 45 45 F 45 45	DILTEND 0.92
S 50 99 99 R 45 0 0 F 0 45	DILTEND 0.50
S 50 99 99 R 45 0 0 F 45 45	DILTEND 0.50
S 50 99 99 R 45 0 45 F 0 45	DILTEND 0.02
S 50 99 99 R 45 0 45 F 45 45	DILTEND 0.25
S 50 99 99 R 45 45 0 F 0 45	DILTEND 0.73
S 50 99 99 R 45 45 0 F 45 45	DILTEND 1.00
S 50 99 99 R 45 45 45 F 0 45	DILTEND 0.21
S 50 99 99 R 45 45 45 F 45 45	DILTEND 0.73

S	99	1	1	R	0	0	0	F	0	45	DILTEND	0.50
S	99	1	1	R	0	0	0	F	45	45	DILTEND	0.50
S	99	1	1	R	0	0	45	F	0	45	DILTEND	0.75
S	99	1	1	R	0	0	45	F	45	45	DILTEND	0.27
S	99	1	1	R	0	45	0	F	0	45	DILTEND	0.00
S	99	1	1	R	0	45	0	F	45	45	DILTEND	0.27
S	99	1	1	R	0	45	45	F	0	45	DILTEND	0.27
S	99	1	1	R	0	45	45	F	45	45	DILTEND	0.08
S	99	1	1	R	45	0	0	F	0	45	DILTEND	0.50
S	99	1	1	R	45	0	0	F	45	45	DILTEND	0.50
S	99	1	1	R	45	0	45	F	0	45	DILTEND	0.98
S	99	1	1	R	45	0	45	F	45	45	DILTEND	0.75
S	99	1	1	R	45	45	0	F	0	45	DILTEND	0.27
S	99	1	1	R	45	45	0	F	45	45	DILTEND	0.00
S	99	1	1	R	45	45	45	F	0	45	DILTEND	0.79
S	99	1	1	R	45	45	45	F	45	45	DILTEND	0.27
S	99	1	50	R	0	0	0	F	0	45	DILTEND	0.25
S	99	1	50	R	0	0	0	F	45	45	DILTEND	0.38
S	99	1	50	R	0	0	45	F	0	45	DILTEND	0.50
S	99	1	50	R	0	0	45	F	45	45	DILTEND	0.15
S	99	1	50	R	0	45	0	F	0	45	DILTEND	0.00
S	99	1	50	R	0	45	0	F	45	45	DILTEND	0.26
S	99	1	50	R	0	45	45	F	0	45	DILTEND	0.26
S	99	1	50	R	0	45	45	F	45	45	DILTEND	0.05
S	99	1	50	R	45	0	0	F	0	45	DILTEND	0.38
S	99	1	50	R	45	0	0	F	45	45	DILTEND	0.25
S	99	1	50	R	45	0	45	F	0	45	DILTEND	0.85
S	99	1	50	R	45	0	45	F	45	45	DILTEND	0.50
S	99	1	50	R	45	45	0	F	0	45	DILTEND	0.26
S	99	1	50	R	45	45	0	F	45	45	DILTEND	0.00
S	99	1	50	R	45	45	45	F	0	45	DILTEND	0.76
S	99	1	50	R	45	45	45	F	45	45	DILTEND	0.26
S	99	50	1	R	0	0	0	F	0	45	DILTEND	0.50
S	99	50	1	R	0	0	0	F	45	45	DILTEND	0.38
S	99	50	1	R	0	0	45	F	0	45	DILTEND	0.62
S	99	50	1	R	0	0	45	F	45	45	DILTEND	0.26
S	99	50	1	R	0	45	0	F	0	45	DILTEND	0.00
S	99	50	1	R	0	45	0	F	45	45	DILTEND	0.15
S	99	50	1	R	0	45	45	F	0	45	DILTEND	0.15
S	99	50	1	R	0	45	45	F	45	45	DILTEND	0.07
S	99	50	1	R	45	0	0	F	0	45	DILTEND	0.38
S	99	50	1	R	45	0	0	F	45	45	DILTEND	0.50
S	99	50	1	R	45	0	45	F	0	45	DILTEND	0.61
S	99	50	1	R	45	0	45	F	45	45	DILTEND	0.62
S	99	50	1	R	45	45	0	F	0	45	DILTEND	0.15
S	99	50	1	R	45	45	0	F	45	45	DILTEND	0.00
S	99	50	1	R	45	45	45	F	0	45	DILTEND	0.43
S	99	50	1	R	45	45	45	F	45	45	DILTEND	0.15
S	99	50	50	R	0	0	0	F	0	45	DILTEND	0.50
S	99	50	50	R	0	0	0	F	45	45	DILTEND	0.50
S	99	50	50	R	0	0	45	F	0	45	DILTEND	0.75
S	99	50	50	R	0	0	45	F	45	45	DILTEND	0.27
S	99	50	50	R	0	45	0	F	0	45	DILTEND	0.00
S	99	50	50	R	0	45	0	F	45	45	DILTEND	0.27
S	99	50	50	R	0	45	45	F	0	45	DILTEND	0.27
S	99	50	50	R	0	45	45	F	45	45	DILTEND	0.08
S	99	50	50	R	45	0	0	F	0	45	DILTEND	0.50
S	99	50	50	R	45	0	0	F	45	45	DILTEND	0.50
S	99	50	50	R	45	0	45	F	0	45	DILTEND	0.98
S	99	50	50	R	45	0	45	F	45	45	DILTEND	0.75
S	99	50	50	R	45	45	0	F	0	45	DILTEND	0.27
S	99	50	50	R	45	45	0	F	45	45	DILTEND	0.00
S	99	50	50	R	45	45	45	F	0	45	DILTEND	0.79
S	99	50	50	R	45	45	45	F	45	45	DILTEND	0.27

4. Data flow and user interface

4.1 For each keyboard control, provide a GUI button or menu option that performs the same function

Plot Tendency viewer window

Keyboard key	Equivalent GUI button or menu
.	Plot Tendency Options Adjust Strike button
,	Plot Tendency Options Adjust Strike button
m	Plot Tendency Options Adjust Dip button
n	Plot Tendency Options Adjust Dip button
[Print Screen]	Plot Tendency Print button

Stress Ratio Graph viewer window

l	Right mouse button
Keyboard key	Equivalent GUI button or menu
[Print Screen]	Stress Ratio Graph Print button

3-D Fault viewer window

Keyboard key	Equivalent GUI button or menu
o	Middle mouse button
i	Middle mouse button
r	3D Fault Reset button
[Spacebar]	3D Fault Options Select Mode buttons
[F9]	3D Fault Options Show Axis button
[F10]	3D Fault Options Average Mode button
[F11]	3D Fault Options Rotate Mode buttons
[F12]	3D Fault Options Display buttons
[Print Screen]	3D Fault Print button

Map viewer window

Keyboard key	Equivalent GUI button or menu
o	Middle mouse button
i	Middle mouse button
r	Map Reset button
[Print Screen]	Map Print button

Surface viewer window

Keyboard key	Equivalent GUI button or menu
o	Middle mouse button
i	Middle mouse button
r	Surface Reset button
[F8]	Surface Options Bounding Box button
[F9]	Surface Options Base button
[F10]	Surface Options Axis button
[F11]	Surface Options Points buttons
[F12]	Surface Display buttons
[Print Screen]	Surface Print button

5. Programming language

5.1 Utilize the C++ programming language and compiler to construct 3DStress

- a. Verify that the source files used to create 3DStress are written using the C++ language. The C++ compiler on the SGI system is called CC as shown in the example compile execution below.

```
CC -O viewNet.c++ -o ../bin/3dstress.exp linFileClass.o
surfClass.o      surfCallbacks.o      graphClass.o
graphCallbacks.o viewerClass.o viewerCallbacks.o
gfxCallbacks.o  gfxClass.o  viewClass.o  sceneClass.o
axesClass.o     overlayClass.o  cmdClass.o  plotClass.o
lineClass.o     boundBox.o  remove.o  vectorClass.o
rotClass.o      mapClass.o  mapCallbacks.o  roseClass.o
roseCallbacks.o roseButtonCB.o  viewerButtonCB.o
gfxButtonCB.o   surfButtonCB.o  controlClass.o
controlerCallbacks.o  mapButtonCB.o  optionClass.o
optionCallbacks.o  covClass.o  graphButtonCB.o
gfxOptionClass.o  gfxOptionCB.o  viewerOptionClass.o
viewerOptionCB.o  surfOptionClass.o  surfOptionCB.o
mapOptionClass.o  mapOptionCB.o  covWidgetClass.o
covWidgetCB.o    overlayWidgetClass.o  overlayWidgetCB.o
roseOptionClass.o  roseOptionCB.o  vblFile.o  fileShower.o
destroyFS.o       saveWindow.o  infoWidget.o  helpWidget.o
notice.o          -L../libs  -lGLU -lGLw -lXm -lXt -lGL -lX11
-lm -lXpm
```

6. Hardware platforms

6.1 Execute 3DStress on Silicon Graphics workstations operating IRIX 5.3

- a. On the system executing 3DStress type the following command to verify the operating system number.

```
% uname -a
IRIX performer 5.3 11091811 IP19 mips
```

- b. Verify that the IRIX version number is 5.3.

7. Graphic output devices

7.1 Store screen displays to raster image files

- a. For each of the following windows, open the window, select the Print button, select a file name (rgb) to save the raster image file.

Tendency Plot window
 Stress Ratio Graph window
 3D Fault Viewer window
 Map Viewer window
 Surface Viewer window

- b. Display each of the saved images on the screen using the ipaste command as shown below.

```
% ipaste file.rgb
```

8. Summary

The preceding test procedures were conducted on 3DStress, version 1.2, on October 15, 1996. 3DStress was executed on a Silicon Graphics Onyx workstation named performer located in the CNWRA GIS lab in San Antonio, Texas. The computed values and displays from 3DStress were compared to the values and figures in this document and found to be in complete agreement.

Software Developer: Burt Hendon Date: 10/31/96

Element Manager: H. Lawrence McKee Date: 10/31/96

Installation Test for 3DStress Version 1.2

October 31, 1996

I. Introduction

This document specifies the installation testing procedure and results for 3DStress version 1.2. The installation test is used to verify that the software is properly installed on a target system as required by CNWRA Technical Operating Procedure TOP-018, Revision 4, section 5.6. 3DStress is an application program for interactively computing and displaying the slip and dilation tendency of faults and fractures. Refer to the Software Requirements Description and the user's manual for 3DStress, version 1.2 for more information on using 3DStress.

II. Test Procedure

1. Install the 3DStress program in a subdirectory. The following files are required:

3dstress	(executable file)
.3dstress_help	(showcase help file)

The permissions of the above files must be set so that users may access and execute these files. The help file requires the *showcase* software application from Silicon Graphics to be loaded. See your local site administrator for help installing 3DStress and *showcase*.

2. Execute 3DStress by changing the current directory to the directory that contains the 3DStress executable file or by adding the directory to your *path* environmental variable. For example, to modify the *path* variable enter the following command:

```
% set path = ( $path 3dstress_directory )
```

Where *3dstress_directory* is the name of the directory that contains the 3DStress executable file.

3. Check the version number of the 3DStress executable by entering the following command. Verify that the version number is 1.2.

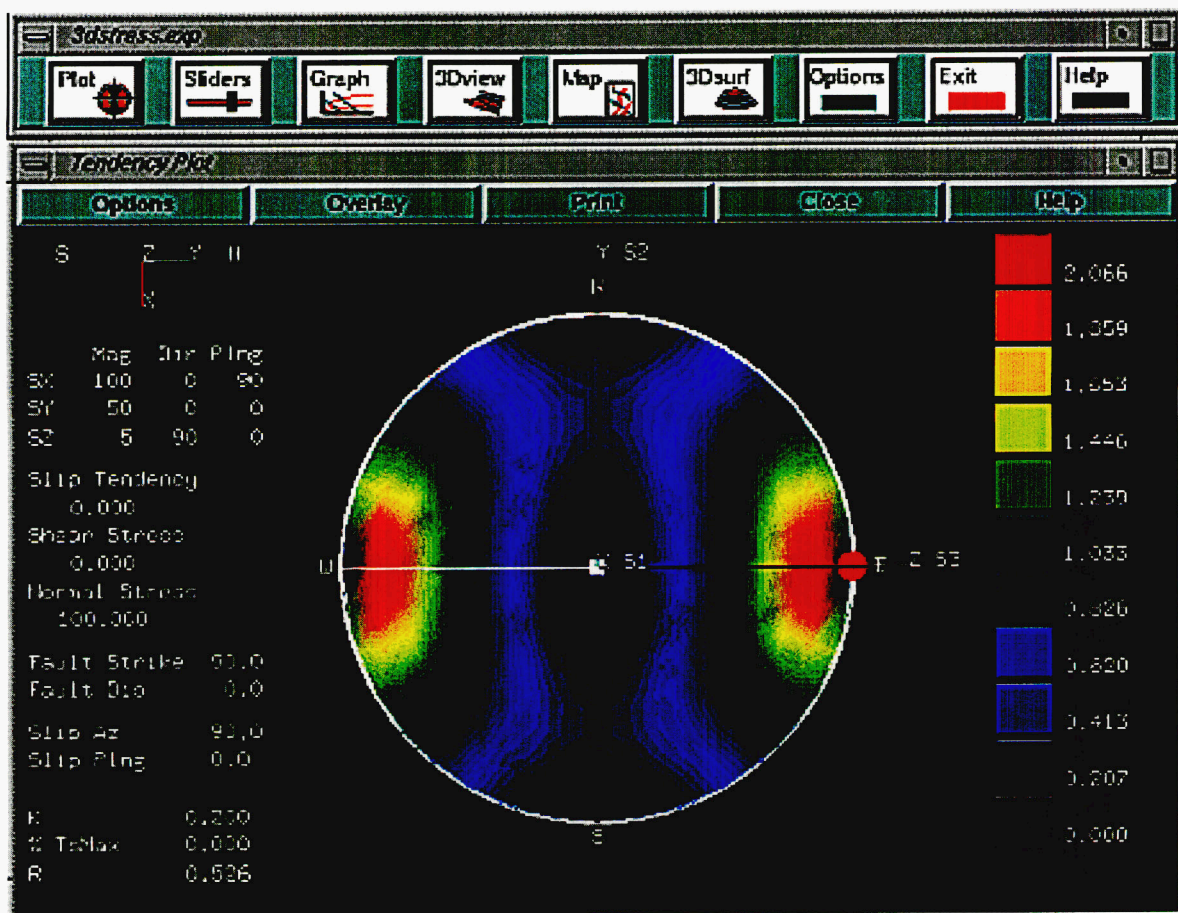
```
% 3dstress -h

@(#)3dstress 09-30-96 Rev 1.2
Usage: 3dstress [-f font size]
        [-b button color]
        [-c window color]
        [-h help]
        -r filename
        -d sx sy sz   rx ry rz   fstrike fdip
        [Dilation tendency]
        -s sx sy sz   rx ry rz   fstrike fdip
        [Slip tendency]
```

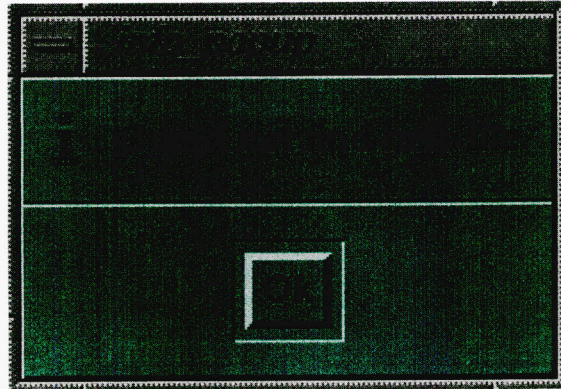
4. Execute 3DStress by typing the following command:

```
% 3dstress
```

The main control and Tendency Plot windows should appear as shown below.



5. If you execute 3DStress from the directory where the help file is located, 3DStress will automatically find the help file. However, if you execute 3DStress from another directory an error message will be displayed as shown below.



If you encounter the error message above, exit 3DStress and enter the following command:

```
% setenv 3DSTRESS_HOME help_file_directory
```

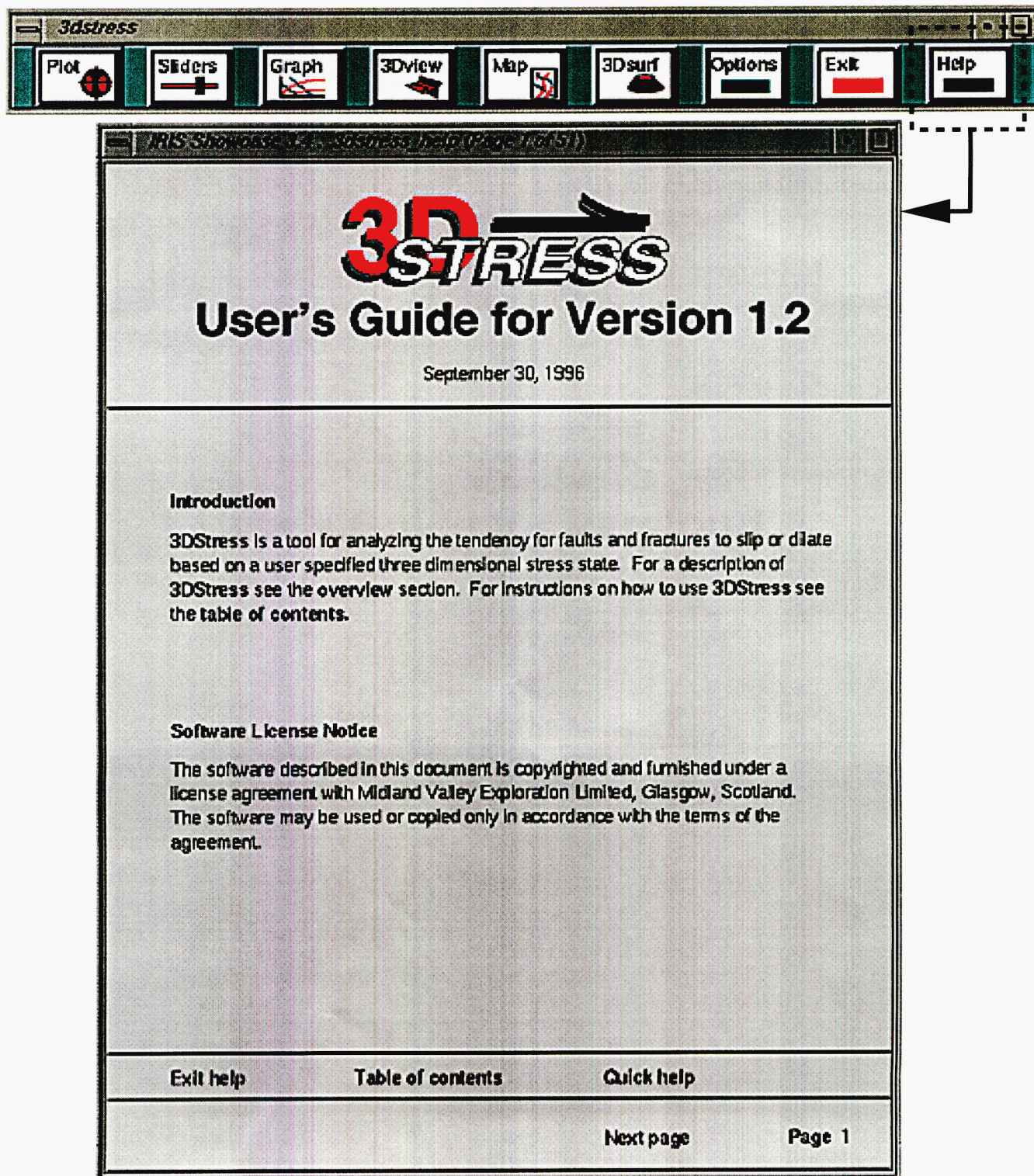
Where *help_file_directory* is the name of the directory where the help file is currently located.

For example, if the help file is loaded in /usr/local/bin, then enter:

```
% setenv 3DSTRESS_HOME /usr/local/bin
```

Now execute 3DStress and verify that the above error message does not appear.

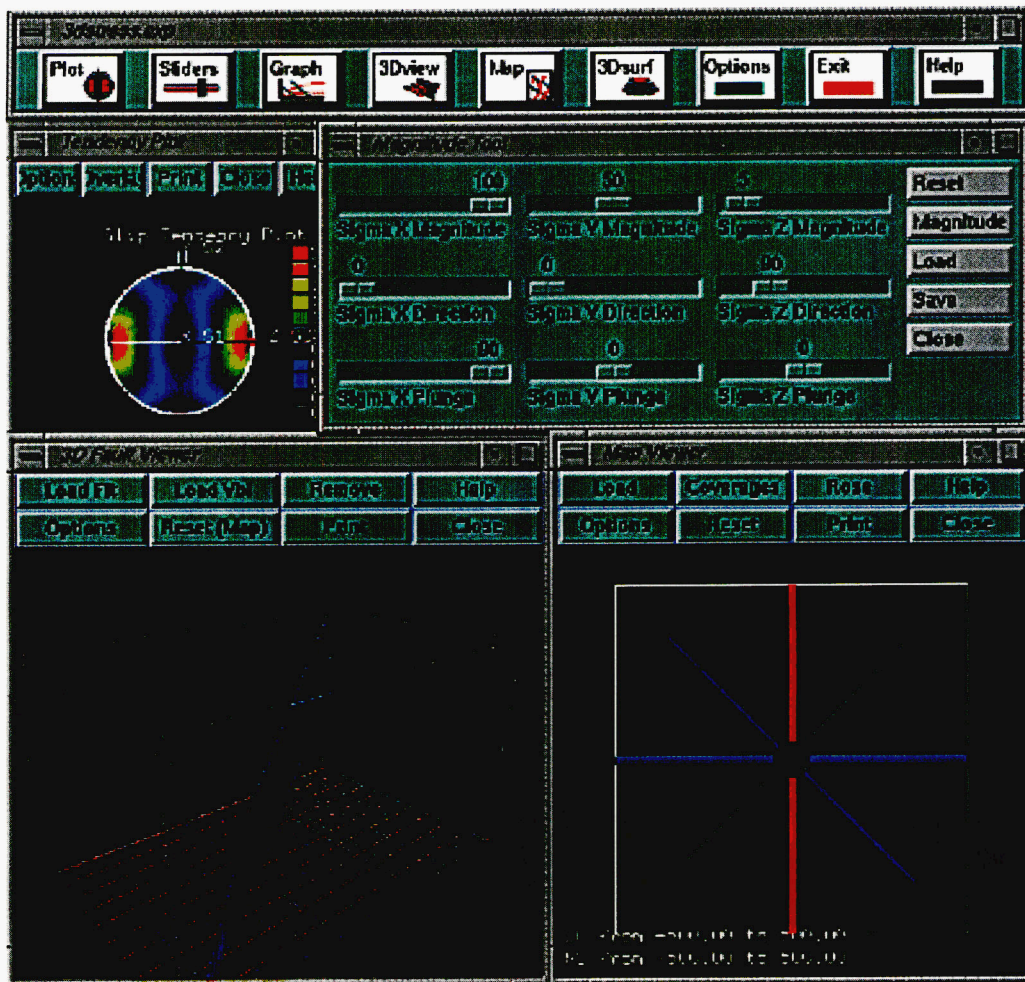
6. Press the help button on the main control window and verify that the *showcase* help file loads as shown in the figure below. If the help file does not load, verify that the help file is loaded and that the *showcase* application is loaded on the system. Refer to steps 1 and 5 for additional information.



7. Open the 3Dview, Sliders, and Map windows. Use the Load Vbl button in the 3D Fault Viewer window to load 3-D fault files also called Vbl files.

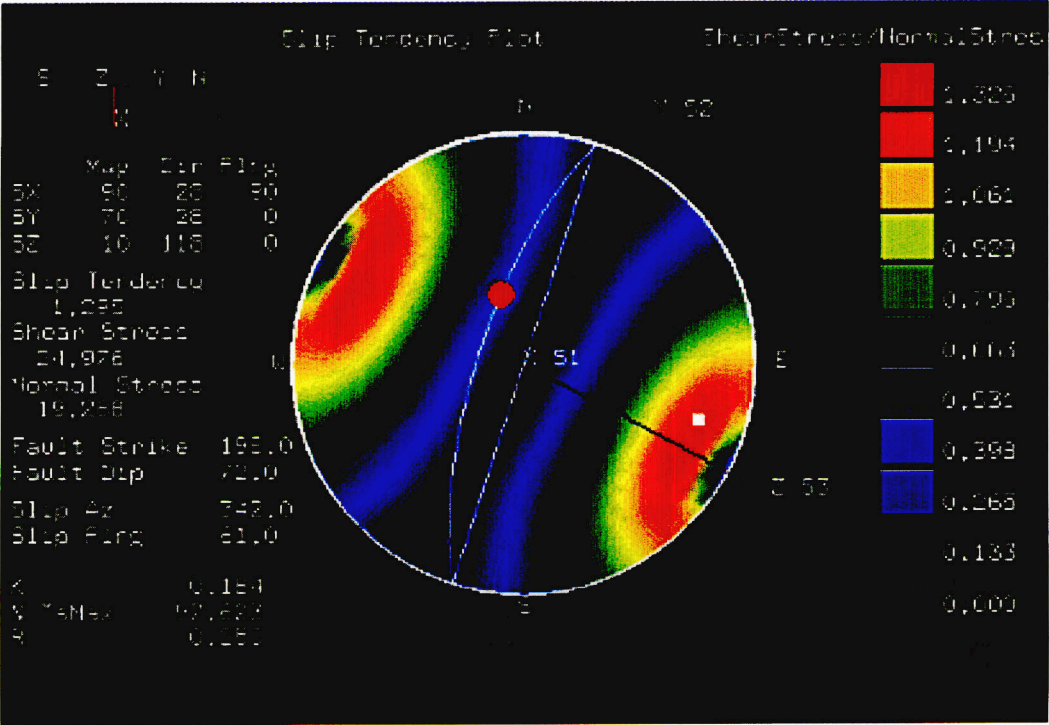
Vbl files are created using a text editor or written from the 3DMove software system from Midland Valley Exploration. The files tc1.vbl and tc3.vbl are both shown in the 3D Fault Viewer window below.

Use the Load button in the Map Viewer window to load a 2-D coverage file also called a Lin file. Lin files are created using a text editor or by exporting line coverages from the ARC/INFO software system from ESRI. The file angles45.lin is shown in the Map Viewer window below. Verify that the fault and line files load and display correctly. The display should look similar to the figure below.



8. Use the sliders to modify the stress magnitudes and orientations to the following values: Sigma X Magnitude 90, Sigma Y Magnitude 70, Sigma Z Magnitude 10, Sigma X Direction 28, Sigma X Plunge 90, Sigma Y Direction 28, Sigma Z Direction 118.

Press the left mouse button in the Tendency Plot window and move the cursor to select a fault orientation of strike 198 and dip 72. Verify that the following values are displayed in the Tendency Plot window: Slip Tendency 1.3, Shear Stress 24.9, and Normal Stress 19.3.

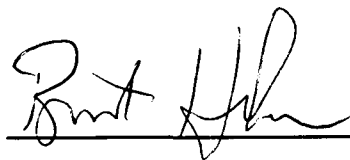


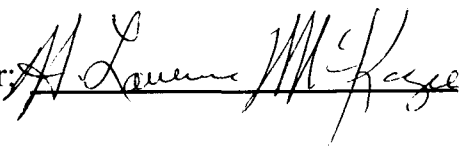
9. If a problem is noted in any of the above tests then reinstall 3DStress and repeat these tests. If the problem still occurs then contact:

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(210) 522-5155 fax
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III Summary

Installation testing of 3DStress, version 1.2, was conducted on October 17, 1996. The software was executed on a Silicon Graphics Onyx workstation named performer in the CNWRA GIS lab in San Antonio, Texas. The software passed all of the installation tests specified in this report.

Software Developer:  Date: 10/30/96

Element Manager:  Date: 10/30/96