



LS-TAURUS TUTORIAL

Version 930

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LS-TAURUS TUTORIAL

**An Interactive Post-Processor for
LS-DYNA3D**

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LS-TAURUS Tutorial I

This is a basic viewing tutorial which leads a user through the elementary viewing commands in the post-processing program, LS-TAURUS. When LS-DYNA3D is run, it produces a file called "D3PLOT" which is needed to run the graphical portion of LS-TAURUS. To run the tutorial, first create a directory and copy the result files from the included example problem, "sample.dyn", to that directory.

In order to enter LS-TAURUS and begin this tutorial, double click the LS-TAURUS executable, which may, for convenience, be positioned in the directory where the D3PLOT files are contained. After this action, one window, split into three different viewing areas, will appear on the screen: a graphics view, a message view, and a command view. Now type "g=d3plot" in the command view to read in the data file.

Rotating and Viewing Commands

vs	Plot the geometry with hidden lines removed and with a unique color for each material.
triad	Display a triad in the lower left-hand corner of the screen for all future viewing commands. The triad tracks the model coordinates as the model rotates. This option is turned off by the RESTORE command or by reissuing this command.
rx -90	Rotate the body -90 degrees about the x -axis in screen coordinates. A positive rotation in counterclockwise.
v	Plot or display geometry with hidden lines removed (no color).
ry 20	Rotate the body 20 degrees about the y -axis in screen coordinates. A positive rotation is counterclockwise.
v	Plot or display geometry with hidden lines removed (no color).
rx 20	Rotate the body 20 degrees about the x -axis in screen coordinates. A positive rotation is counterclockwise.
vs	Plot the geometry with hidden lines removed and with a unique color for each material.

BASIC VIEWING

rx -20 vs	Rotate the body -20 degrees about the x -axis in screen coordinates and view the image in color. The vs command can be appended to the rotation command as shown here so that a separate command line is not necessary.
ry 180 vs	Rotate the body 180 degrees about the y -axis in screen coordinates and view the image in color.
rx 20	Rotate the body 20 degrees about the x -axis in screen coordinates.
v	Plot or display geometry with hidden lines removed (no color).
vs	Plot the geometry with hidden lines removed and with a unique color for each material.
g	Plot geometry without hidden lines removed and with a unique color for each material.
rz 45	Rotate the body 45 degrees about the z -axis in screen coordinates. A positive rotation is counterclockwise.
vs	
rz -45	Rotate the body -45 degrees about the z -axis in screen coordinates.
vs	

Deformed Shapes

lst	List the available states and corresponding times contained in the database.
state 4	Read state 4 into memory.
vs	
s 8 vs	Read state 8 into memory and view it on the screen in color.
s 12 vs	Read state 12 into memory and view it on the screen in color.
s 16 vs	Read state 16 into memory and view it on the screen in color.
s 20 vs	Read state 20 into memory and view it on the screen in color.

time 4 State corresponding to time 4 ms is read into memory. If 4 ms does not correspond to a particular state in the database, LS-TAURUS will interpolate between two states to time 4 ms. If 4 ms exceeds the maximum or minimum time in the database, LS-TAURUS will extrapolate to time $t = 4$ ms using the last or first two states, respectively.

vs

Display Selected Parts

lpm List parts and materials.

p 3 vs Display only part 3.

&p 1 vs Add part 1 to list. Parts 1 and 3 are now displayed.

p 2 vs Display only part 2.

&p 4 vs Add part 4 to list. Parts 2 and 4 are now displayed.

dam Display all materials.

vs

Zooming and Clipping

where Print out the current transformation of the model and show an overhead view of where the model is with respect to a person viewing it. This includes the angle of view and distance between the viewer and object.

dist 300 Distance between the origin of the model and the origin of the display space is set to $d=300$. Initially d is defaulted to 1.75 times the maximum of the x, y, and z ranges. The value d may be increased to shrink the model and decreased to enlarge or zoom in on the model.

vs

dist 700 vs The distance d is set to 700.

where Described above.

BASIC VIEWING

zmin 650 Set the front clipping plane to 650. This refers to the distance described in the **dist** command, all parts of the object located further than 650 units from the viewing point will be viewed.

vs

where

zmax 750 vs Set the back clipping plane to 750 units. Now the view will include all pieces between 650 and 750 units from the viewing point.

where

zmax 1000 Set the back clipping plane to 1000 units. The viewing depth is now increased from 750 to 1000.

vs

where

zmin 0 Set the front clipping plane to 0.

where

vs

center Center geometry, use to center all currently displayed parts in frame.

Scaling Deformations

state 10 Read state 10 into memory. This command can be abbreviated as: **s 10**.

vs

zscale 0.5 Scale the z-component of the initial geometry by 0.5.

vs

zscale 1.0 Scale the z-component of the initial geometry by 1. This will bring it back to its original state.

yscale 0.5 Scale the y-component of the initial geometry by 0.5.

vs

rx 40 Rotate the frame 40 degrees about the x -axis.

vs

yscale 1.0 Scale the y -component of the initial geometry by 1.

xscale 0.25 Scale the x -component of the initial geometry by 0.25.

vs

Animation

restore Zeroes all translations and relative origins, destroys all reflected parts, initializes all rotation matrices to the identity matrix, resets scale factor to 1, and centers picture.

vs

rx -90 ry 45 rx 20 vs Rotate the frame about the x -axis by -90 degrees, the y -axis by 45 degrees and the x -axis again by 20 degrees, then view the new orientation of the frame in color.

state 1 vs Read state 1 into memory and view the geometry.

r Repeat command. LS-TAURUS will repeat the command that immediately follows the request for information which follow in the next three input lines. This command applies to the "VIEW" and "CONTOUR" commands.

1 LS-TAURUS will request the first state to be viewed. Here we are specifying that state 1 be the first state.

21 LS-TAURUS will request the last state to be viewed. Here we are specifying that state 21 be the last state to be repeated.

2 LS-TAURUS will request the increment to be used for repeating the command. Here we are specifying that the command be repeated for every other state.

vs This is the command which will be repeated as specified above. This series of commands will effectively produce an animation of the LS-DYNA3D run.

BASIC VIEWING

Use File menu, Exit option, to terminate session.

LS-TAURUS Tutorial II

This is a slightly advanced viewing tutorial which leads a user through many useful viewing commands in the post-processing program, LS-TAURUS. When LS-DYNA3D is run, it produces a file called "D3PLOT" which is needed to run the graphical portion of LS-TAURUS. To run the tutorial, first create a directory and copy the result files from the included example problem, "sample.dyn", to that directory. The files are the same as used in the Basic Viewing Tutorial.

In order to enter LS-TAURUS and begin this tutorial, double click the LS-TAURUS executable, which may, for convenience, be positioned in the directory where the D3PLOT files are contained. After this action, one window, split into three different viewing areas, will appear on the screen: a graphics view, a message view, and a command view. Now type "g=d3plot" in the command view to read in the data file.

Set Up A Good View

triad	Display a triad in the lower left-hand corner of the screen for all future viewing commands. The triad tracks the model coordinates as the model rotates. This option is turned off by the RESTORE command or by reissuing this command.
rx -90	Rotate the body -90 degrees about the x -axis in screen coordinates. A positive rotation is counterclockwise.
ry 20	Rotate the body 20 degrees about the y -axis in screen coordinates. A positive rotation is counterclockwise.
rx 20	Rotate the body 20 degrees about the x -axis in screen coordinates. A positive rotation is counterclockwise.
vs	Plot the geometry with hidden lines removed and with a unique color for each material.
full	Full screen mode for X or GL graphics. Use "TPOFF" to hide scroll text and "TPON" to return it.
vs	
lst	List state numbers and corresponding times contained in the database.
state 2	Read state 2 into memory.

ADVANCED VIEWING

vs

Fringe Plots I

fringe 9 Fringe component #9 on all displayed materials. Component numbers are all given by the "ECOMP" command. Component #9 refers to the Von Mises stress.

fringe 7 Fringe component #7 on all displayed materials. Component #7 refers to the effective plastic strain.

fringe 23 Fringe component #23 on all displayed materials. Component #23 refers to the velocity in the z-direction.

state 10 Read state 10 into memory.

vs

fringe 19 Fringe component #19 on all displayed materials. Component #19 refers to the displacement in the z-direction.

state 20 Read state 20 into memory.

vs

Undeformed Geometry

udg -1 Plot undeformed geometry as solid lines. This command will cause the original undeformed geometry to remain plotted on the screen while the new geometries are being plotted. This is very convenient for comparison purposes.

vs

udg 0 Turn off the undeformed geometry command.

vs

Movie (animation)

state 1 Read state 1 into memory.

ADVANCED VIEWING

movie	Repeat multiple commands. LS-TAURUS will request specific information about how the command is to be repeated in the following four prompts.
0	LS-TAURUS will request the starting time. Here we are requesting that LS-TAURUS repeat the commands starting at time $t=0$.
20	LS-TAURUS will request the ending time. Here we are requesting that LS-TAURUS stop repeating the commands starting at time $t=20$.
10	LS-TAURUS will request the number of increments over which to evenly divide the commands. Here we are requesting that the command be repeated over 10 equal intervals.
1	LS-TAURUS will now ask for the number of commands to be repeated at each interval. Here we are specifying that we repeat only 1 command at each interval.
vs	This is the command line which will be repeated at each time interval. Here we are specifying that we view the frame image in color at each time increment.

Fringe Plots II

range -150 0	The contours range in value from -150 to 0. If not defined, LS-TAURUS determines an optimal range. To turn off this command, repeat with range 0 0.
s 1	Read state 1 into memory.
fringe 19	Fringe component #19 on all displayed materials. Component #19 refers to the displacement in the z-direction.
s 10	Read state 10 into memory.
fringe 19	
s 20	Read state 20 into memory.
fringe 19	
s 3	Read state 3 into memory.
vs	

ADVANCED VIEWING

range 0 0.6	The contours range in value from 0 to 0.6.
fringe 9	Fringe component #9 on all displayed materials. Component #9 refers to the Von Mises stress.
nfringe 8	Increase the number of fringe colors to 8, default is 5, a number greater than 9 will increase the number of colors and change the contour legend.
fringe 9	
foption 2	Set fringe contours constant over elements based on maximum nodal value.
fringe 9	
foption 0	Reset to normal variation.
fringe 9	
legend	Switch on or off legend for fringe plots with levels ≥ 9 and in hardware plots.
fringe 9	
contour 9	Contour component #9 on all displayed materials. Component #9 refers to the Von Mises stress.
pssv	Display principal stress vectors at each element.
range 0 0	Turn off the range command so that LS-TAURUS automatically set the range.
psnv	Display principal strain vectors at each element.
nfringe 5	Set the number of fringe colors to 5.
psnv	Display principal strain vectors at each element.
vect v 0.3	Display velocity vectors with a scale factor of 0.3.
vect d 0.3	Display displacement vectors with a scale factor of 0.3.

ADVANCED VIEWING

Model Information

dist 200	Set the viewing distance to 200 units.
vs	
p 1	Display only part 1.
vs	
elplt	Plot the element numbers on the displayed mesh.
ndplt	Display mesh with nodal points labeled with node numbers.
pick	Obtain information on element picked by the mouse or cursor from the screen.

Plotting - Creating Graphic Files of Images

psplot	Create a black and white PostScript file of the image.
psrgb	Create a color PostScript file of the image.
hppl	Create an HPGL file of the image (good for importing into work processors like WordPerfect).
	Use File menu, Exit option, to terminate session.

LS-TAURUS Tutorial III - Phase 3

This is a basic viewing tutorial which leads a user through elementary commands in the ASCII plotting portion of LS-TAURUS, known as phase 3. When LS-DYNA3D is run, it can produce many ASCII files, each containing different information about the simulation. To run the tutorial, first create a directory and copy the result files from the included example problem, "sample.dyn", to that directory. The files are the same as used in the Basic Viewing Tutorial.

In order to enter LS-TAURUS, phase 3 and begin this tutorial, double click the LS-TAURUS executable, which may, for convenience, be positioned in the directory where the D3PLOT files are contained. After this action, one window, split into three different viewing areas, will appear on the screen: a graphics view, a message view, and a command view. Hit enter to proceed to phase 3 result files.

You can enter phase 3 of LS-TAURUS even if you have gotten into the graphical portion (phase 1) using "g=d3plot").

phs3 Send LS-TAURUS into phase 3 mode. The first command once in the phase 3 mode is to specify which ASCII file you want to view.

RWFORC - Rigid Wall Forces

rwforc Load the file containing rigid wall information.

When prompted for a filename, press ENTER.

normal Display a graph of the normal force vs. time.

oscl -1 Scale the ordinate (y-axis) values by a value (-1).

oset 0 250 Set the minimum (0) and maximum (250) values on the ordinate.

normal Display the graph of the normal force vs. time with the options just specified (**oset**, **oscl**) intact.

smooth 3 Each data point in the graph is replaced by an average of **2n** (2x3) data points.

normal Re-display the previous graph with the effects of the **smooth** command intact.

PHASE 3

z-force	Display a graph of the z-force on the wall vs. time. The options specified above will still be used.
help	Display a list of all commands at your disposal for the particular ASCII file you are using.
grid	Place grid lines on all future graphs.
normal	Display normal force vs. time with newly specified options.
quit	Exit from the rwforc file.

Note: The next four commands reset the options you have previously changed.

nogrid	Turn off the grid option.
smooth 0	Turn off the smooth option.
oscl 1	Reset the ordinate scale to 1.
oset 0 0	Reset the ordinate scale to automatically adjust for each different graph.

NODOUT - Nodal Output

nodout	Load the file containing information on nodes. When prompted for a filename, press ENTER.
z-vel	Plot the z-component of the velocity for all nodes specified vs. time.
z-disp	Plot the z-component of the displacement for all nodes specified vs. time.
z-disp 7 259	Plot the z-component of the displacement for nodes 7 and 259 (Given that nodes 7 and 259 were specified in LS-DYNA3D).
z-accel	Plot the z-component of the acceleration for all nodes specified vs. time.
smooth 4	Each data point in the graph is replaced by an average of 2n (2x4) data points.

z-accel	Plot the z-component of the acceleration with a moving average of 8 points.
quit	Exit from nodout file.
smooth	Reset the smooth option.

GLSTAT - Global Statistics

glstat	Load the ASCII file containing global statistics. When prompted for a filename, press ENTER.
total	Display the total energy of the system vs. time.
internal	Display the internal energy of the system vs. time.
oset 0 3.4e+04	Set the minimum (0) and maximum (3.4e+04) values on the ordinate.
otxt	Re-define the text label on the ordinate (y-axis). When prompted enter: <i>Energy</i>
total	Display the total energy of the system vs. time with the oset and otxt option changes in place.
over internal	Overlay the internal energy on top of the previous graph.
over kinetic	Overlay the kinetic energy on top of the previous graph.
over hourglass	Overlay the hourglass energy on top of the previous graph.
over stone	Overlay the energy absorbed by the stonewall on top of the previous graph.
oset 0 0	Reset the scale on the ordinate to automatically adjust to the maximum and minimum of each graph.
otxt	Re-define the text label on the ordinate (y-axis). When prompted enter: <i>Time Step</i>
step	Plot the time step vs. time.
oset 0 5.4e-04	Set the minimum (0) and maximum (5.4e-04) values on the ordinate.

PHASE 3

step Plot the time step vs. time.

quit Exit from **glstat** file.

MATSUM - Material Summary

matsum Load the ASCII file containing material energy data.

When prompted for a filename, press ENTER.

oset 0 0 Reset the scale on the ordinate to automatically adjust to the maximum and minimum of each graph.

otxt Re-define the text label on the ordinate (y-axis).

When prompted enter: *Energy*

kinetic Display a graph showing how the kinetic energy changes in each material with time.

internal 2 3 Display a graph of the internal energy in material #'s 2 and 3.

hour Display the hourglass energy in each material.

oset 0 2.6e+03 Set the minimum (0) and maximum (2.6e+03) values on the ordinate.

internal 1 Display a graph of the internal energy in material 1.

over hour 1 Overlay the hourglass energy of material 1 on top of the previous graph.

quit Exit from **matsum** file.

Use File menu, Exit option, to terminate session.