

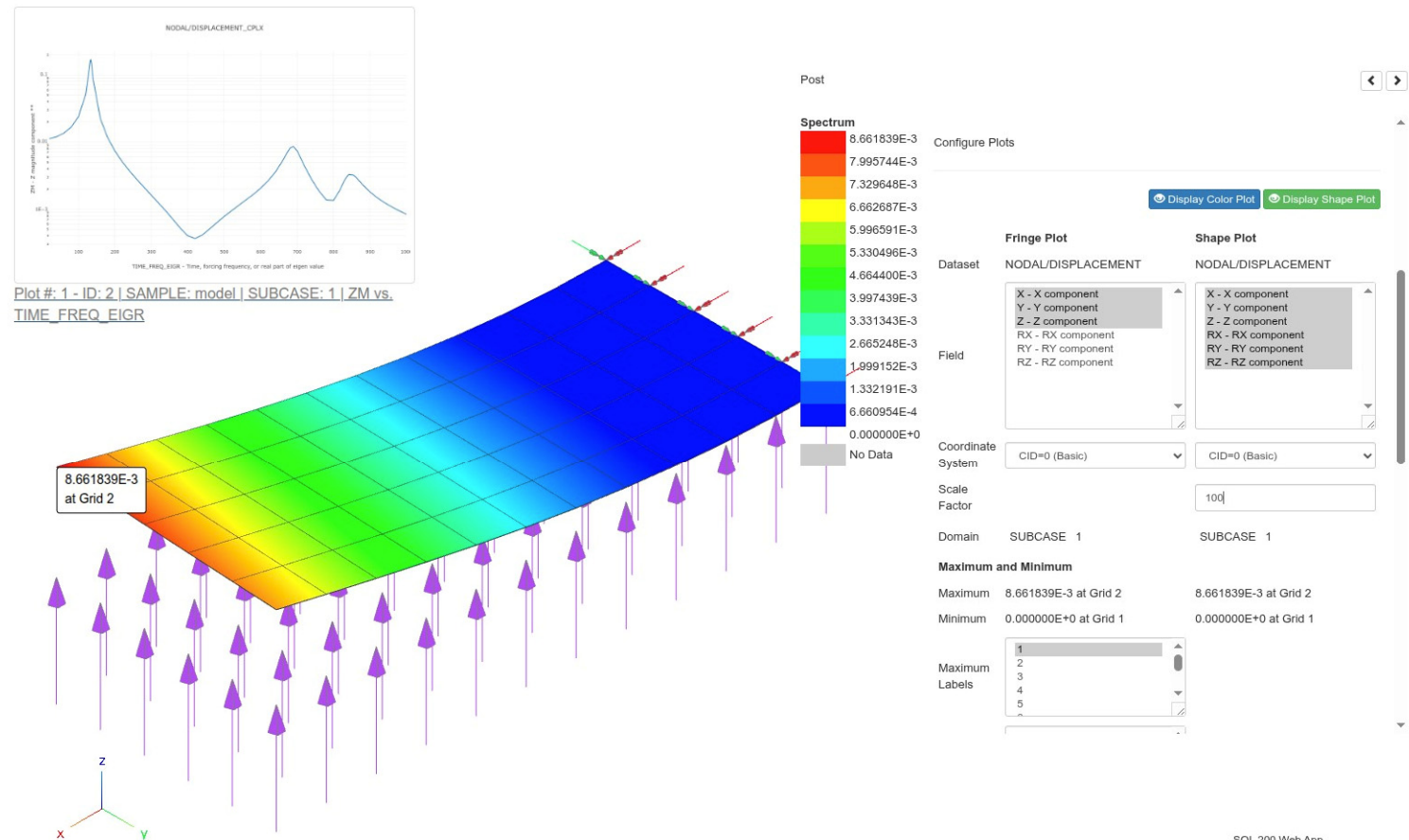
Pre/Post Web App Workshop - Statics, Normal Modes and Frequency Response Analysis

AN MSC NASTRAN TUTORIAL

Goal: Configure a statics, normal modes and frequency response analysis with MSC Nastran and review results

Agenda

- Units
- Meshing
- Supports
- Normal Modes Analysis
- Linear Statics Analysis
- Saving Progress
- Frequency Response Analysis



Details of Analysis Model

- This exercise is a recreation of workshop 6 from the NAS 102 training course. A description of the analysis model is shown to the right.

WORKSHOP 6

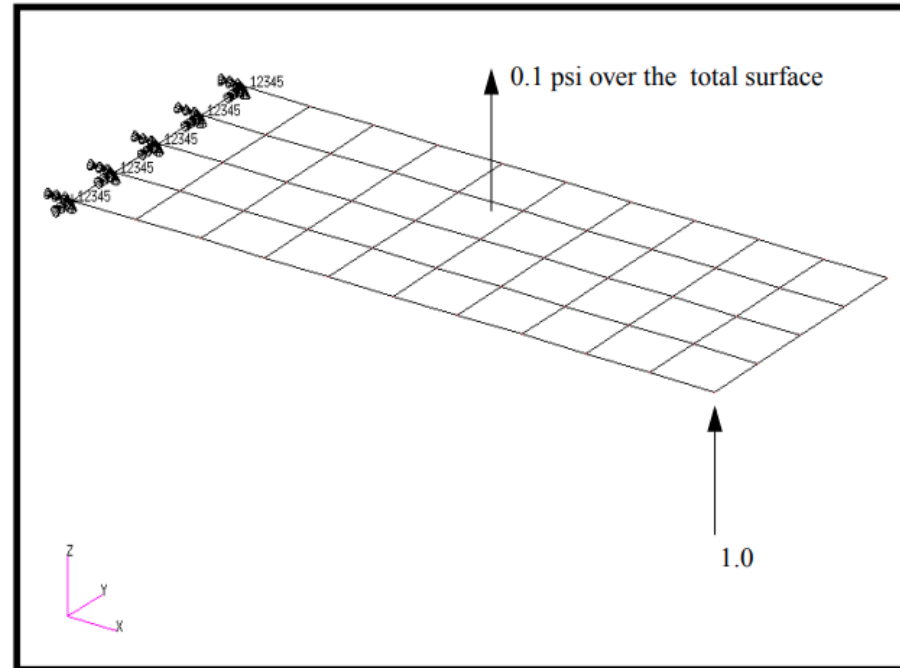
Modal Frequency Response Analysis

Model Description:

Using the modal method, determine the frequency response of the flat rectangular plate, created in Workshop 1, excited by a 0.1 psi pressure load over the total surface of the plate and a 1.0 lb. force at a corner of the tip lagging 45°. Use a modal damping of $\xi = 0.03$. Use a frequency step of 20 hz between a range of 20 and 1000 hz; in addition, specify five evenly spaced excitation frequencies between the half power points of each resonant frequency between the range of 20-1000 hz.

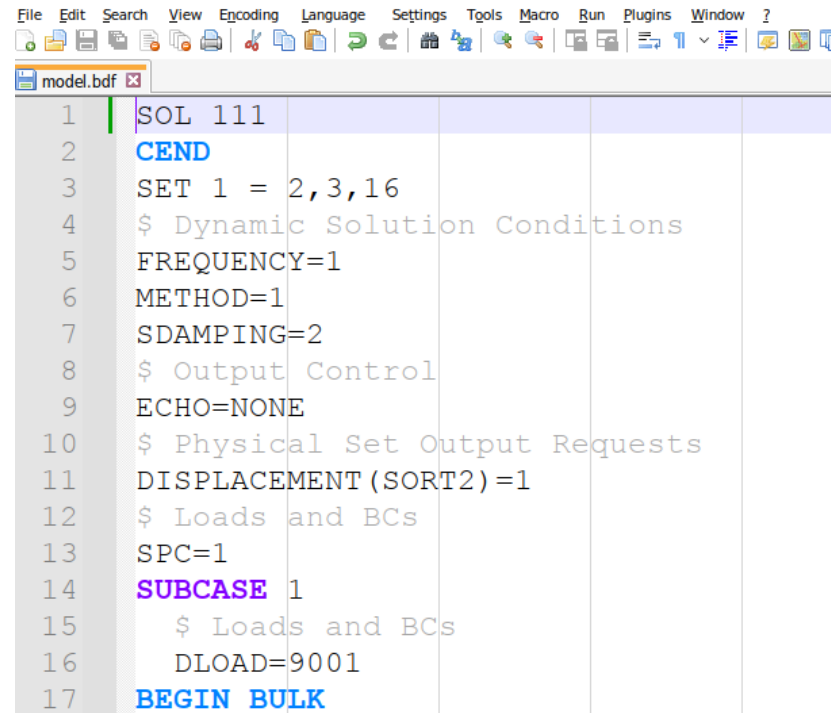
Below is a finite element representation of the flat plate. It also contains the loads and boundary constraints.

Figure 6.1-Loads and Boundary Conditions



Bulk Data File

This workshop will detail how to construct the case control section and each bulk data entry shown in the images to the right.



```
File Edit Search View Encoding Language Settings Tools Macro Run Plugins Window ?
model.bdf
1 SOL 111
2 CEND
3 SET 1 = 2,3,16
4 $ Dynamic Solution Conditions
5 FREQUENCY=1
6 METHOD=1
7 SDAMPING=2
8 $ Output Control
9 ECHO=NONE
10 $ Physical Set Output Requests
11 DISPLACEMENT (SORT2) =1
12 $ Loads and BCs
13 SPC=1
14 SUBCASE 1
15 $ Loads and BCs
16 DLOAD=9001
17 BEGIN BULK
```

M O D E L		S U M M A R Y	
ENTRY	NAME	NUMBER OF ENTRIES	
-----	-----	-----	-----
	CQUAD4		55
	DLOAD		1
	EIGRL		1
	FORCE		1
	FREQ1		1
	FREQ4		1
	GRID		72
	HDF5OUT		1
	MAT1		1
	PARAM		2
	PLOAD2		1
	PSHELL		1
	RLOAD2		2
	SPC1		1
	TABDMP1		1
	TABLED1		1

Contact me

- Nastran SOL 200 training
- Nastran SOL 200 questions
- Structural or mechanical optimization questions
- Access to the SOL 200 Web App

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Tutorial

Units

Units

The following system of units is used. All inputs are in this system of units, including material properties, loads, lengths, etc.

Length	in
Mass	lbf**
Density	lbf/in ³
	PARAM, WTMASS, .00259*
Force	lbf

* Since weight density is used (lbf/in³ or weight/volume), the mass matrix will have units of weight (lbf) and is not valid/consistent. The conversion factor WTMASS=.00259 converts weight (lbf) to mass (slinch) and ensures the mass matrix has units of mass (slinch).

** The mass matrix has units of slinch, but the OUTPUT GRID POINT WEIGHT GENERATOR reports lbf.

Meshing

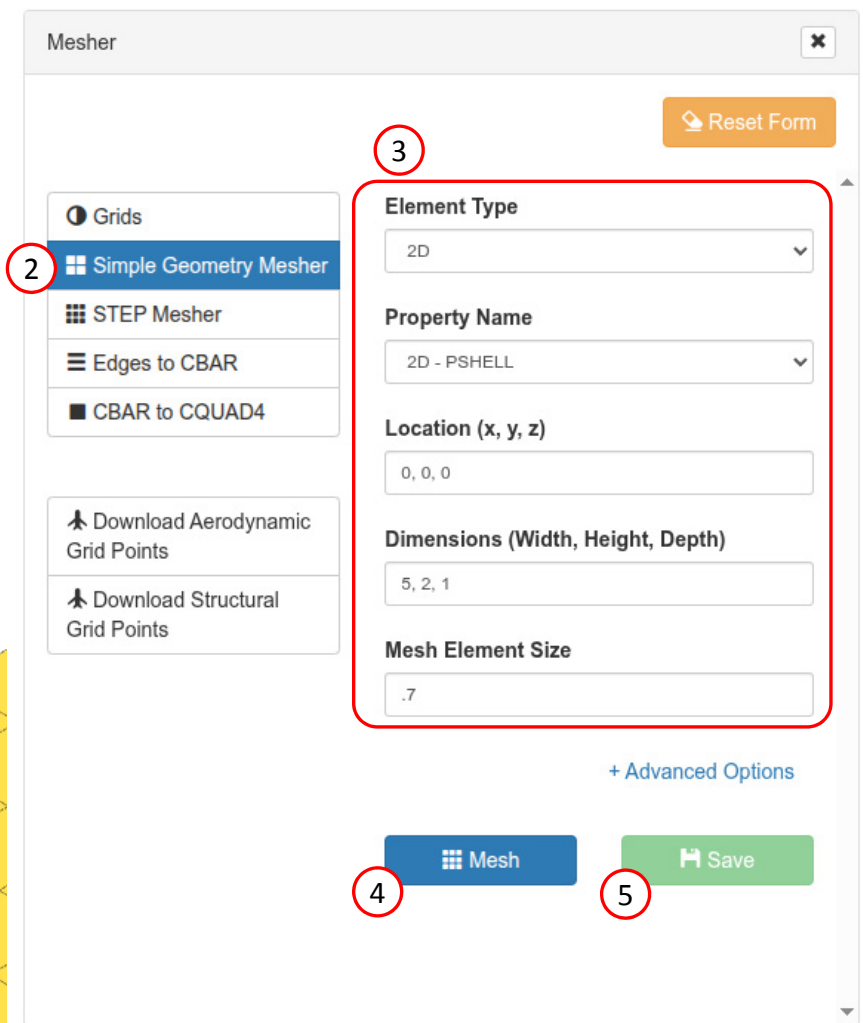
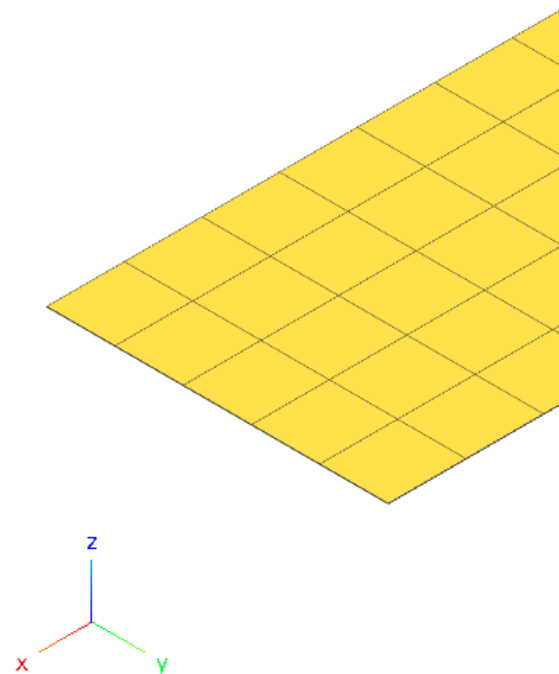
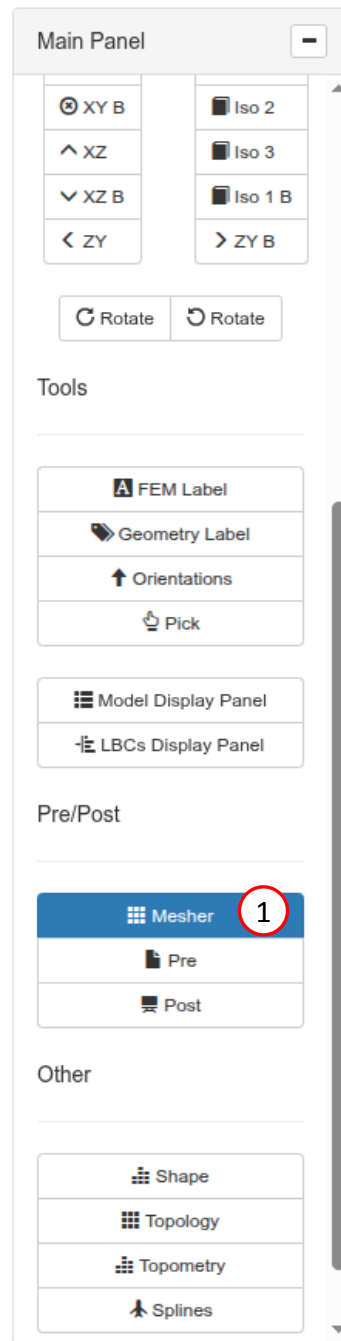
Open the Viewer

1. Click on the indicated link



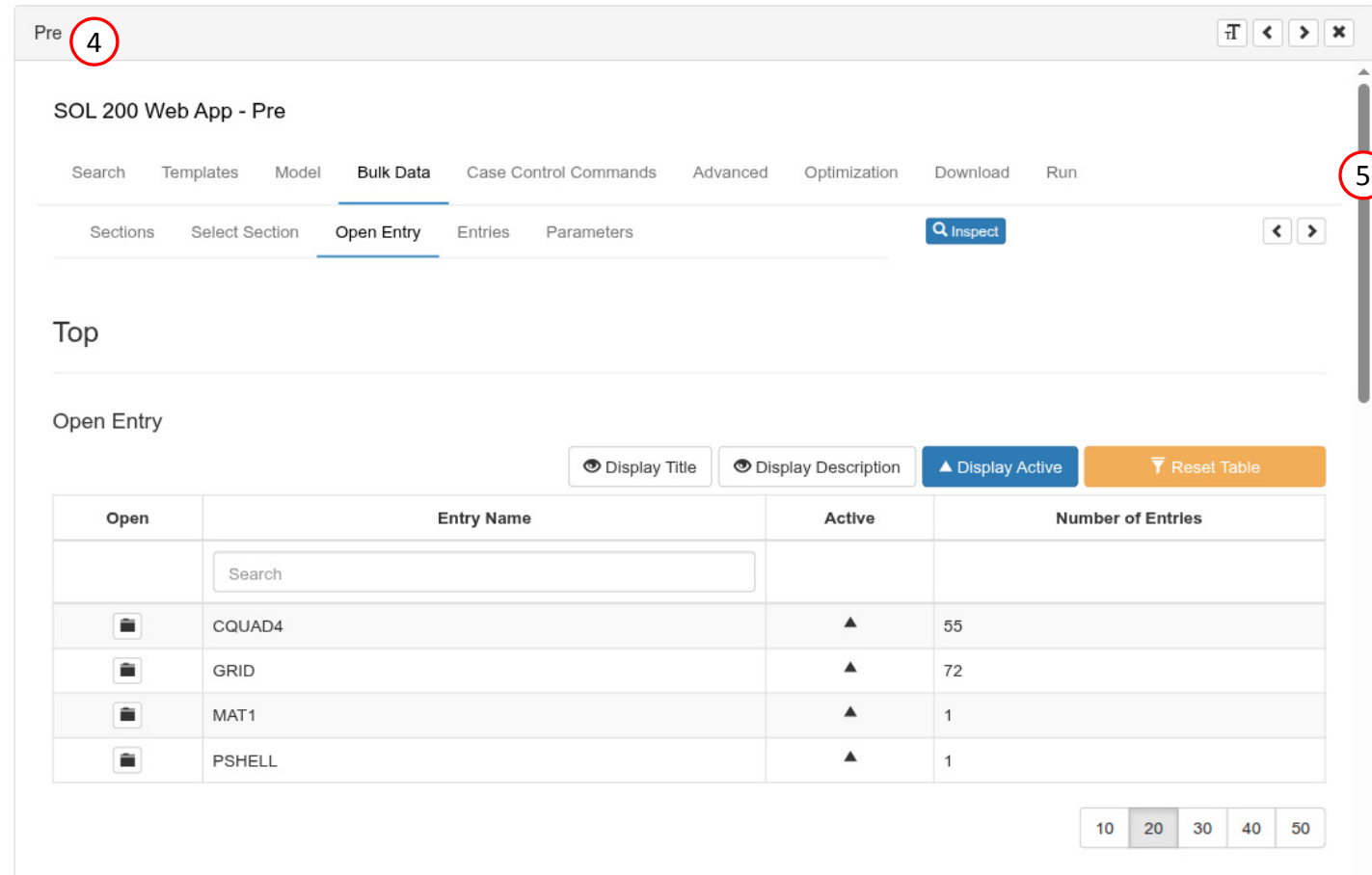
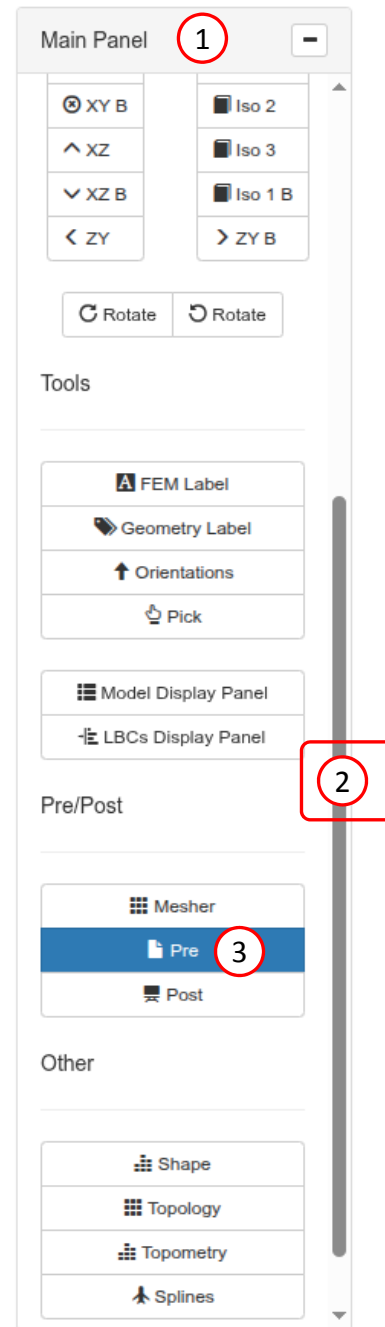
Meshing

1. Click Mesher
2. Click Simple Geometry Mesher
3. Set the following
 - Element Type: 2D
 - Property Type: 2D - PSHELL
 - Location (x, y, z): 0, 0, 0
 - Dimensions (Width, Height, Depth): 5, 2, 1
 - Mesh Element Size: .7
4. Click Mesh
5. Click Save



Pre Panel

1. Refer to the Main Panel
2. Vertically scroll down
3. Click Pre
4. The Pre panel is now opened
5. The indicated scroll bar is used to scroll the panel



MAT1 - Isotropic Material Property Definition

1. Click Model
2. Click MAT1
3. For the existing entry, supply the following values.
 - E: 3.E7
 - NU: .3
 - RHO: .282

Pre

SOL 200 Web App - Pre Search Templates **Model** Bulk Data Case Control Commands Advanced Optimization Download Run

Inspect

Materials

Close All

Common

Materials Properties Loads And BCs

Specializations

Aeroelasticity Contact Dynamics Fatigue Geometry Miscellaneous Multipoint Constraints Partitioning

Tables

TABLED1 TABLED2 TABLED3 TABLED4 TABLED5 TABLEM1 TABLES1 TABLET

Isotropic

MAT1

Orthotropic

MAT3 MAT8 MATORT

Anisotropic

MAT2 MAT9

2D/3D Progressive Failure

MATCB

Top

Configure MAT1

Batch All Download CSV Upload CSV

Delete	MID	E	G	NU	RHO	Thermal Expansion Coefficient (Real)
	Search	Search	Search	Search	Search	Search
	Material identification number. (Integer > 0)	Young's modulus. (Real > 0.0 or blank)	Shear modulus. (Real > 0.0 or blank)	Poisson's ratio. (-1.0 < Real < 0.5 or blank)	Mass density. (Real)	Thermal Expansion Coefficient (Real)
	Integer	Real	Real	Real	Real	Real
	1	3.E7	Real	.3	.282	Real

PSHELL - Shell Element Property

1. Click Close All
2. Click Properties
3. Click PSHELL
4. Ensure the thickness is set to 0.1
5. Click X to close the Pre panel

Pre

SOL 200 Web App - Pre Search Templates **Model** Bulk Data Case Control Commands Advanced Optimization Download Run

Close All **1**

Properties

Common

- Materials
- Properties **2****
- Loads And BCs

Specializations

- Aeroelasticity
- Contact
- Dynamics
- Fatigue
- Geometry
- Miscellaneous
- Multipoint Constraints
- Partitioning

Entries Table

- Top
- Middle
- Bottom

3D PSOLID PSOLDN1

2D **3** PSHELL PSHLN1 PSHELL1

Shear PSHEAR

Composite PCOMP PCOMPG

Composite - Plane Strain or Axisymmetric PCOMPG

Top

Configure PSHELL

Batch All

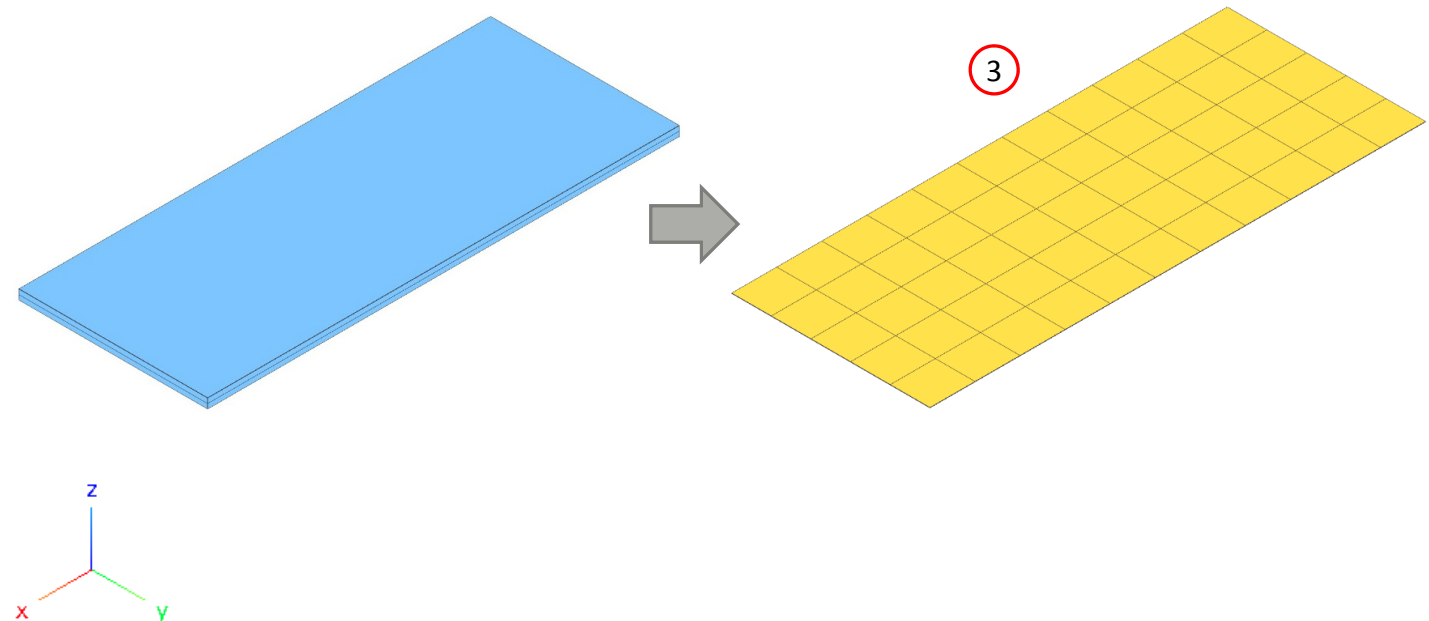
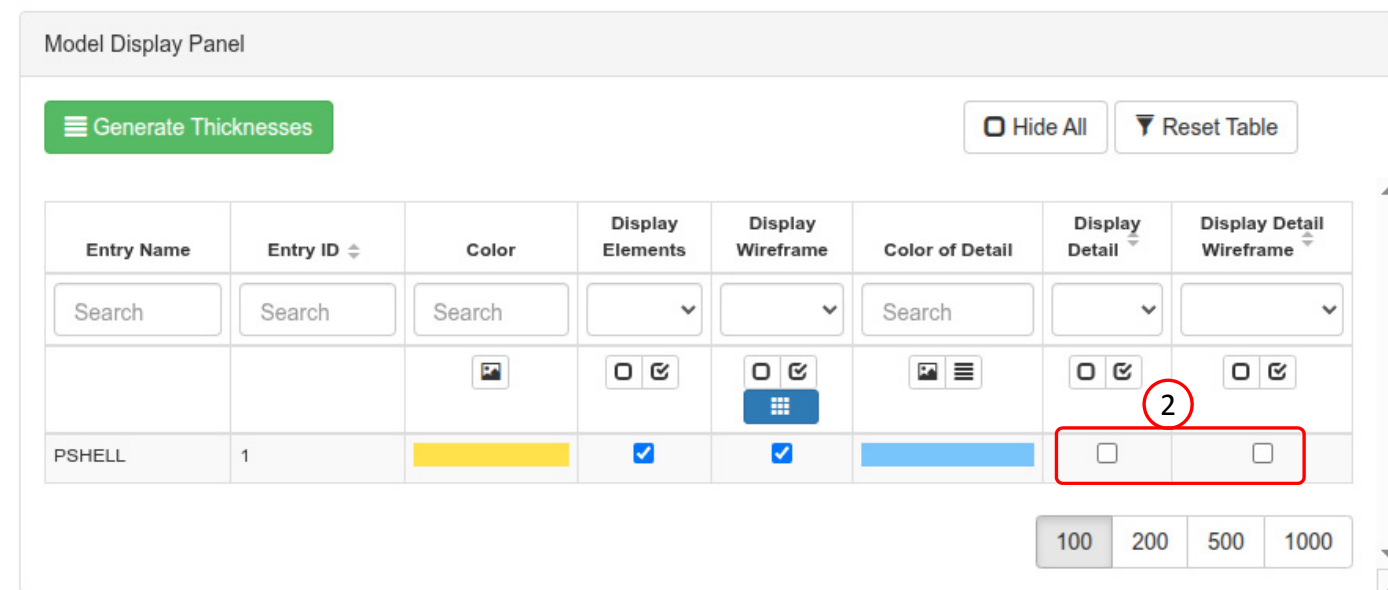
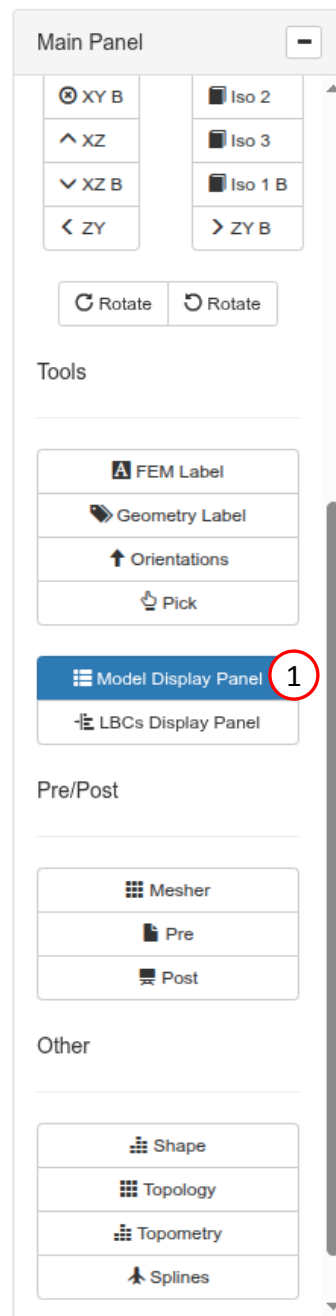
Download CSV Upload CSV

Delete	PID	MID1	T	MID2	12I/T**3
	Search	Search	Search	Search	Search
	Property identification number. (Integer > 0)	Material identification number for the membrane. (Integer > ...	Default membrane thickness for Ti on the connection entry. If ...	Material identification number for bending. (Integer > -1 or...	Bending moment of inertia ratio . Ratio of the actual bending...
	Integer ↓	↓	Real ↓	↓	Real ↓
X	1	MAT1 - 1	0.1 4	MAT1 - 1	Real

PSHELL Thickness

When the thickness is modified, the thickness is automatically displayed in the model display panel.

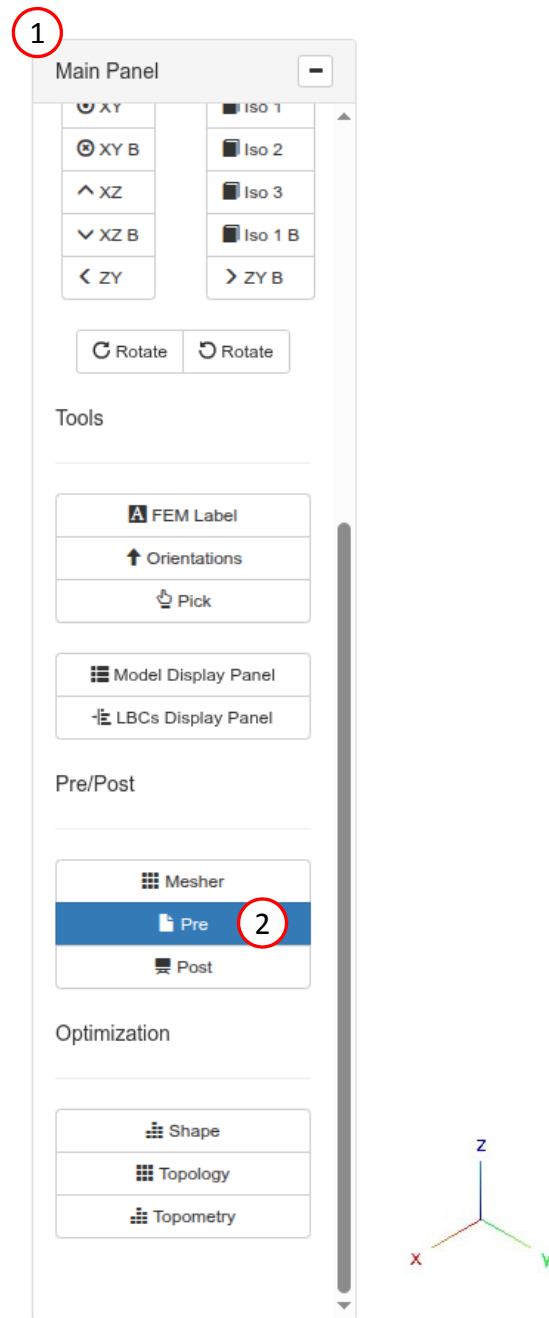
1. Click Model Display Panel
2. Unmark the indicated checkboxes
3. The thickness is now hidden



Supports

Pre

1. Refer to the Main Panel
2. Click Pre



SPC1 - Single-Point Constraint

1. Click Model
2. Recall the indicated scroll bar is used to scroll the panel
3. Click Close All
4. Click Loads and BCs
5. Click SPC1
6. The table for SPC1 is now visible

Pre

SOL 200 Web App - Pre Search Templates **Model** Bulk Data Case Control Commands Advanced Optimization Download Run

Inspect

Close All

↓ Loads And BCs

Single-point Constraints Enforced Displacements Single-point Constraints Other Free Body Supports

Common

Materials Properties Loads And BCs

Specializations

Aeroelasticity Contact Dynamics Fatigue Geometry Miscellaneous Multipoint Constraints Partitioning

Entries Table

Top Middle Bottom

SPC1

SPCD SPC

FLSYM GRDSET SPCAX SPCOFF SPCOFF1

CYSUP SUPAX SUPORT SUPORT1

Top

Configure SPC1

Batch All

Download CSV Upload CSV

Delete	SID	C
	Search	Search
	Identification number of single-point constraint set. (Integer > 0)	Component numbers. (Any unique combination of the Integers 1 through 6 with no embedded blanks for grid points. This number must be Integer 0, 1 or blank for scalar points.)
	Integer	0 1 - TX 2 - TY 3 - TZ 4 - RX 5 - RY

SPC1 - Single-Point Constraint

1. Click Create Entry
2. For the existing entry, supply the following values.
 - C: Select options 1, 2, 3, 4, 5, 6
 - Use the left mouse click and press and hold the CTRL key to select multiple options.
3. Click the Pick button

Pre

Top

Configure SPC1

Batch All

Download CSV

Upload CSV

Reset Table

Create Entry

Close All

Common

- Materials
- Properties
- Loads And BCs

Specializations

- Aeroelasticity
- Contact
- Dynamics
- Fatigue
- Geometry
- Miscellaneous
- Multipoint Constraints
- Partitioning

Entries Table

- Top
- Middle
- Bottom

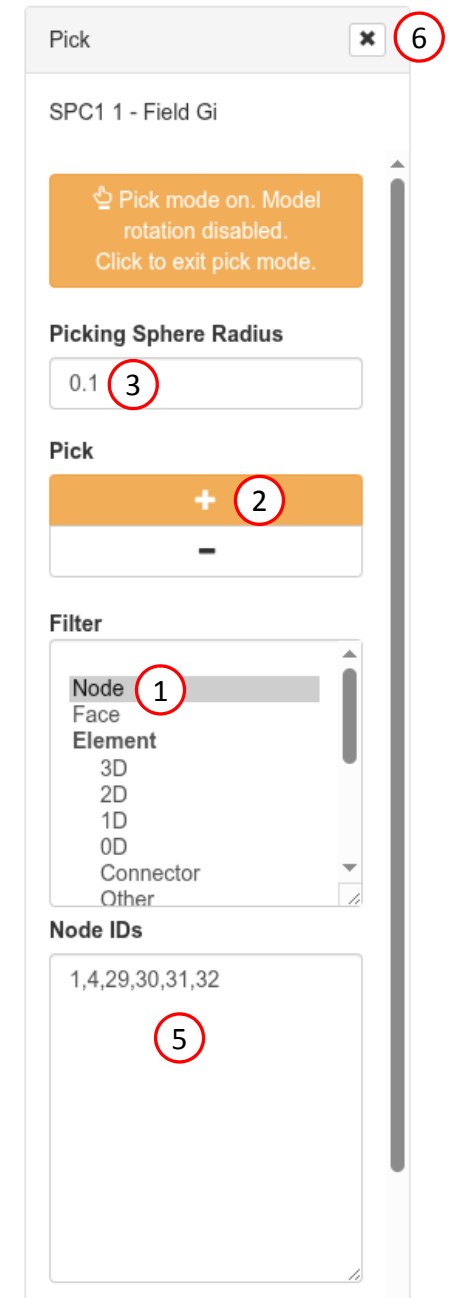
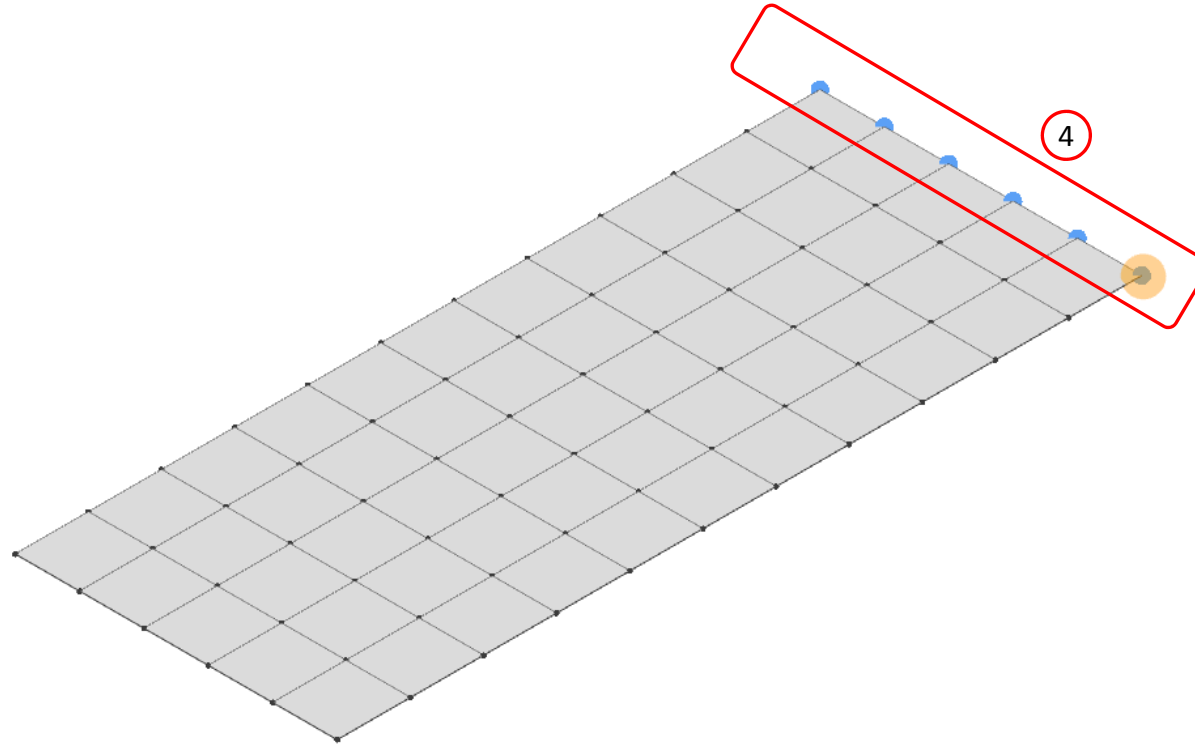
Delete	SID	C	Gi
	Search	Search	Search
	Identification number of single-point constraint set. (Integer > 0)	Component numbers. (Any unique combination of the Integers 1 through 6 with no embedded blanks for grid points. This number must be Integer 0, 1 or blank for scalar points.)	Grid or scalar point identification numbers. (Integer > 0 or "THRU"; For "THRU" option, G1 < G2.)
	Integer	0 1 - TX 2 - TY 3 - TZ 4 - RX 5 - RY 6 - RZ	
X	1	0 1 - TX 2 - TY 3 - TZ 4 - RX 5 - RY 6 - RZ	

10 20 30 40 50

Middle

SPC1 - Single-Point Constraint

1. Set Filter to Node
2. Click +
3. Set Picking Sphere Radius to 0.1
4. Move the mouse cursor to the indicated region. Click and hold the left mouse button, then drag the picking sphere to select
5. The selected node IDs are stored
6. Click X



SPC1 - Single-Point Constraint

- 1. The selected node IDs are now stored
- 2. Click X

Pre

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Configure SPC1

Batch All

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Geometry

Miscellaneous

Multipoint Constraints

Partitioning

Entries Table

Top

Middle

Bottom

Delete	SID	C	Gi
	Search	Search	Search
	Identification number of single-point constraint set. (Integer > 0)	Component numbers. (Any unique combination of the Integers 1 through 6 with no embedded blanks for grid points. This number must be Integer 0, 1 or blank for scalar points.)	Grid or scalar point identification numbers. (Integer > 0 or "THRU"; For "THRU" option, G1 < G2.)
	Integer	0 1 - TX 2 - TY 3 - TZ 4 - RX 5 - RY 6 - RZ	
X	1	0 1 - TX 2 - TY 3 - TZ 4 - RX 5 - RY 6 - RZ	1,4,29,30,31,32

10

20

30

40

50

Middle

LBCs Display Panel

1. Navigate to Main Panel > LBCs Display Panel
2. Mark the checkbox for Entry Name=SPC1
3. Inspect the boundary condition that was created

The screenshot displays the SOL 200 Web App interface. On the left is the 'Main Panel' with various tool categories. The 'LBCs Display Panel' is open on the right, showing a table of boundary conditions. A 3D model of a rectangular plate is in the center, with boundary conditions visualized as arrows along its edges. A callout box for 'SPC1 1' shows a value of 0.0000e+0.

Main Panel

XY B, XZ, XZ B, ZY, Iso 2, Iso 3, Iso 1 B, ZY B, Rotate, Rotate

Tools

FEM Label, Geometry Label, Orientations, Pick

Model Display Panel, **LBCs Display Panel** (1)

Pre/Post

Mesher, Pre, Post

Other

Shape, Topology, Topometry, Splines

LBCs Display Panel

Arrow Length: 1

Display Labels, Scale Arrows, Hide All, Reset Table

Entry Name	Entry ID	Color	Display
SPC1	1	Red, Green, Blue	☒ (2)

5, 10, 50, 100, 200

3

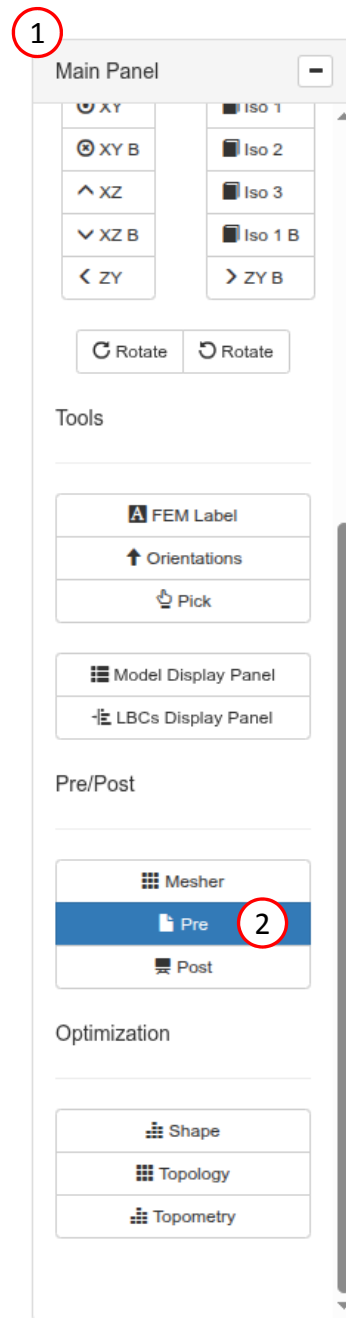
SPC1 1
Value: 0.0000e+0

x, y, z

Normal Modes Analysis

Pre

1. Refer to the Main Panel
2. Click Pre



Template

1. Click Templates
2. Locate the row for SOL 103 or Normal Modes Analysis
3. Click Preview Template
4. A preview is displayed of the bulk data file that contains a configuration for a normal modes analysis
5. Click Apply Template

Pre

SOL 200 Web App - Pre Search **Templates** Model Bulk Data Case Control Commands Advanced Optimization Download Run

Inspect

Reset Table

Analysis Templates

Solution Sequence	Category	Description	Preview Template
Search	Search	Search	
101	Statics	Statics	Preview Template
103	Dynamics	Normal modes	Preview Template
105	Buckling	Buckling	Preview Template
111	Dynamics	Modal Frequency Response Analysis	Preview Template
144	Aeroelasticity	Static Aeroelastic Analysis	Preview Template

5 10 20 50

Reset Table

User Defined Templates

Solution Sequence	Category	Description	Preview Template
Search	Search	Search	
101	Statics	Statics with inertia relief	Preview Template
101	Statics	Statics with inertia relief, Version B	Preview Template

5 10 20 50

Apply Template

```
$ Normal modes
$ Category: Dynamics
SOL 103
CEND
$ Output Control
ECHO=NONE
$ Dynamic Solution Conditions
METHOD=1
$ Physical Set Output Requests
DISPLACEMENT (PLOT)=ALL
SUBCASE 1
BEGIN BULK
PARAM COUPMASS -1
PARAM WTMASS 1.0
EIGRL 1 10
HDF5OUT INPUT NO
ENDDATA
```

Units

1. Click Bulk Data
2. Click Parameters
3. For COUPMASS, use the following value: 1
4. For WTMASS, use the following value: 0.00259

- A. When Display Descriptions is clicked, descriptions for each parameter are listed.
- B. The Display Active button will display all the parameters or only the parameters in use.

Pre

SOL 200 Web App - Pre Search Templates Model **Bulk Data** Case Control Commands Advanced Optimization Download Run

Sections Select Section Open Entry Entries **Parameters** Inspect

Parameters

Display Descriptions Display Active Reset Table

Active	Parameter	Value
	Search	Search
▲	COUPMASS	1
▲	WTMASS	0.00259

5 10 20 30 40 50

EIGRL - Real Eigenvalue Extraction Data, Lanczos Method

1. Click Case Control Commands
2. Click Entries
3. Click EIGRL
4. For the existing entry, supply the following values.
 - V1: 10.
 - V2: 2000.
5. Ensure field ND is blank/empty

Pre

SOL 200 Web App - Pre Search Templates Model Bulk Data **Case Control Commands** Advanced Optimization Download Run

Subcases Loads and BCs Commands Parameters **Entries** Assign Entries [Inspect](#)

METHOD

EIGR EIGRL **3** EIGB

Configure EIGRL

[Batch All](#)

[Download CSV](#) [Upload CSV](#)

Delete	SID	V1	V2	ND	MSGLVL	MAX
	Search	Search	Search	Search	Search	Search
	Set identification number. (Unique Integer > 0)	For vibration analysis: frequency range of interest. ...	For vibration analysis: frequency range of interest. ...	Number of roots desired. (Integer > 0 or blank)	Diagnostic level. (0 < Integer < 4; Default = 0)	Number of vectors
☒	1	10.	2000.	Integer 5	Integer	Integer

SPC - Single Point Constraint Set Selection

- 1. Click Loads and BCs
- 2. Select SPC
- 3. For SPC1 ID=101 select the checkbox in column Above Subcase

Pre

SOL 200 Web App - Pre

Search

Templates

Model

Bulk Data

Case Control Commands

Advanced

Optimization

Download

Run

Subcases

Loads and BCs

Commands

Parameters

Entries

Assign Entries

Inspect

Navigate

Assign

1

Display Descriptions

Selected	Open	Name
		Constraints
		AUTOSPC
		AXISYMMETRIC
		BC
		DSYM
		MPC
		SPC
		STATSUB

Pre

SOL 200 Web App - Pre

Search

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Subcases

Loads and BCs

Commands

Parameters

Inspect

Navigate

Assign

SPC

Display Columns List

Uncheck visible boxes

Check visible boxes

Display Selected

Reset Table

Entry	ID	Above Subcase	SUBCASE 1
SPC1	1	☒	☐

BDF Output

1. Click Download
2. Use the indicated buttons to display the BDF Output section
3. The head of the bulk data file is displayed. The head includes the following sections:
 - NASTRAN Statements
 - File Management Statements
 - Executive Control Statements
 - Case Control Commands
4. Use the indicated buttons to hide the BDF Output section

- A. Optional - NASTRAN Statements, File Management Statements and Executive Control Statements are accessible by clicking Advanced Sections
- B. The BDF Output section is ideal for learning and debugging MSC Nastran models. Any changes made in the interface are immediately updated in the BDF Output section.

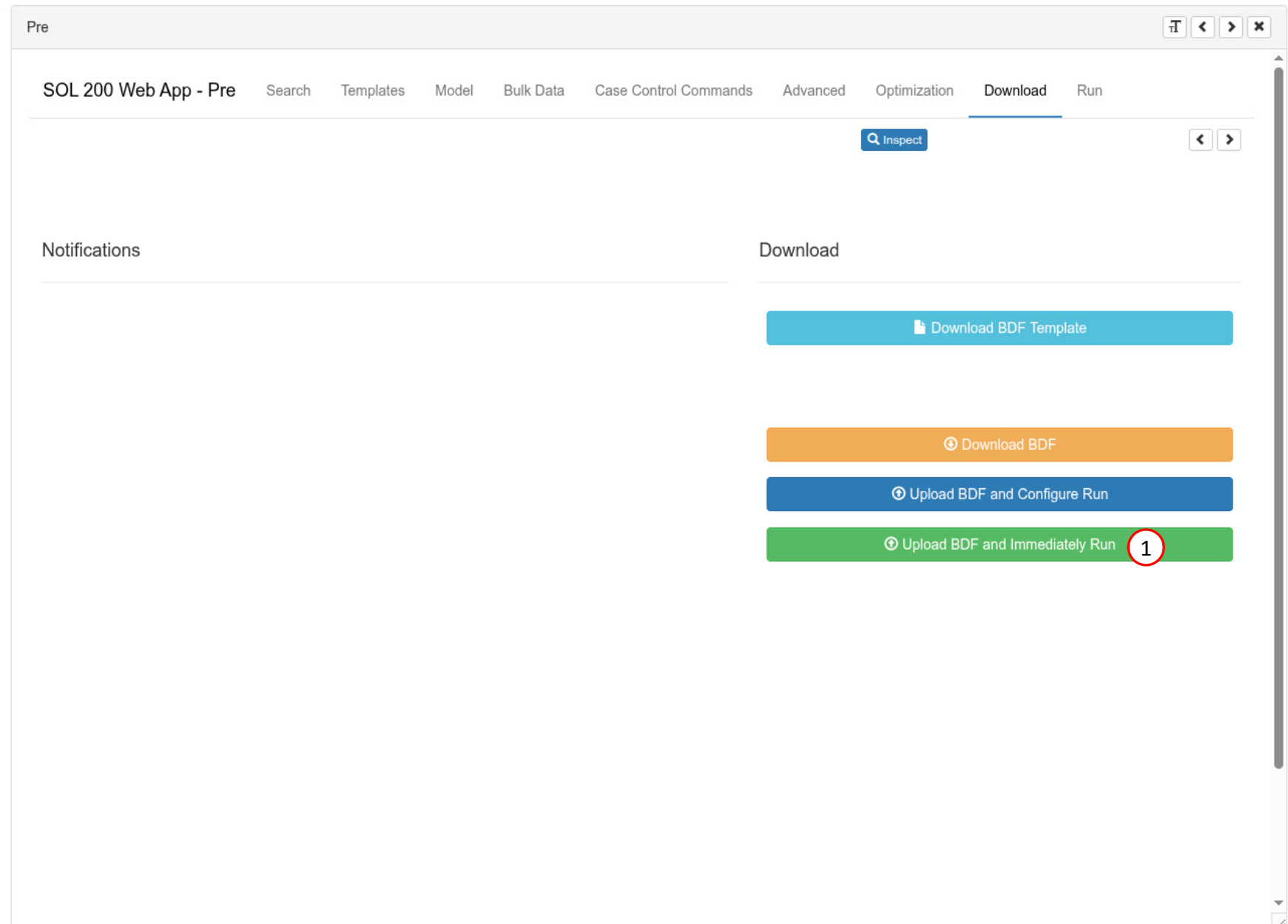
The screenshot displays the 'SOL 200 Web App - Pre' interface. The top navigation bar includes 'Search', 'Templates', 'Model', 'Bulk Data', 'Case Control Commands', 'Advanced', 'Optimization', 'Download' (circled with a red '1'), and 'Run'. Below the navigation bar, the 'Download' section is active, showing three buttons: 'Download BDF Template', 'Download BDF', 'Upload BDF and Configure Run', and 'Upload BDF and Immediately Run'. The 'BDF Output' section (circled with a red 'B') is visible on the right, displaying a code editor with the following text:

```
$ 1 || 2 || 3 || 4 || 5 || 6 || 7 ||  
SOL 103  
CEND  
ECHO=NONE  
$ Dynamic Solution Conditions  
METHOD=1  
$ Physical Set Output Requests  
DISPLACEMENT (PLOT) =ALL  
$ Loads and BCs  
SPC=1  
SUBCASE 1  
BEGIN BULK  
[...]  
ENDDATA
```

 The 'Advanced' tab (circled with a red 'A') is also visible in the navigation bar. The 'Inspect' button is located below the 'Download' tab. The 'BDF Output' section is also circled with a red '3'. The bottom of the interface shows 'Developed by The Engineering Lab'.

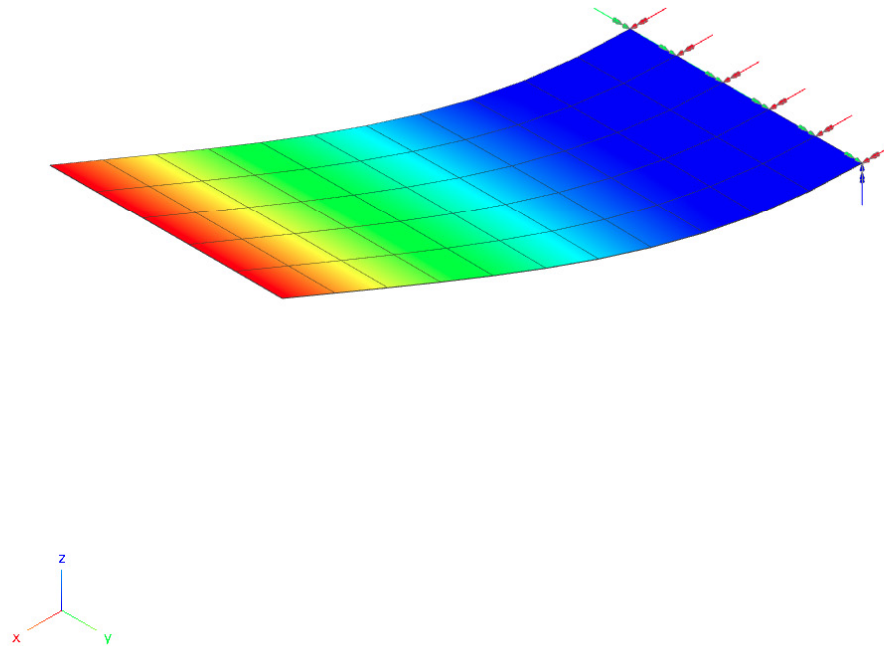
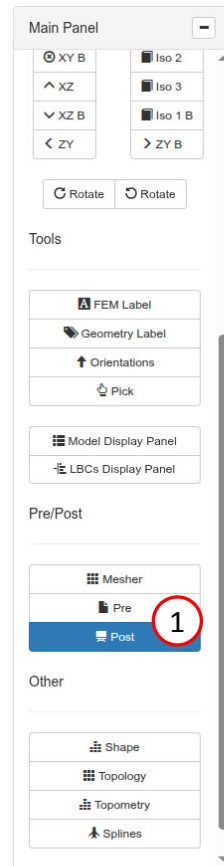
Run

1. Click Upload BDF and Immediately Run



Post

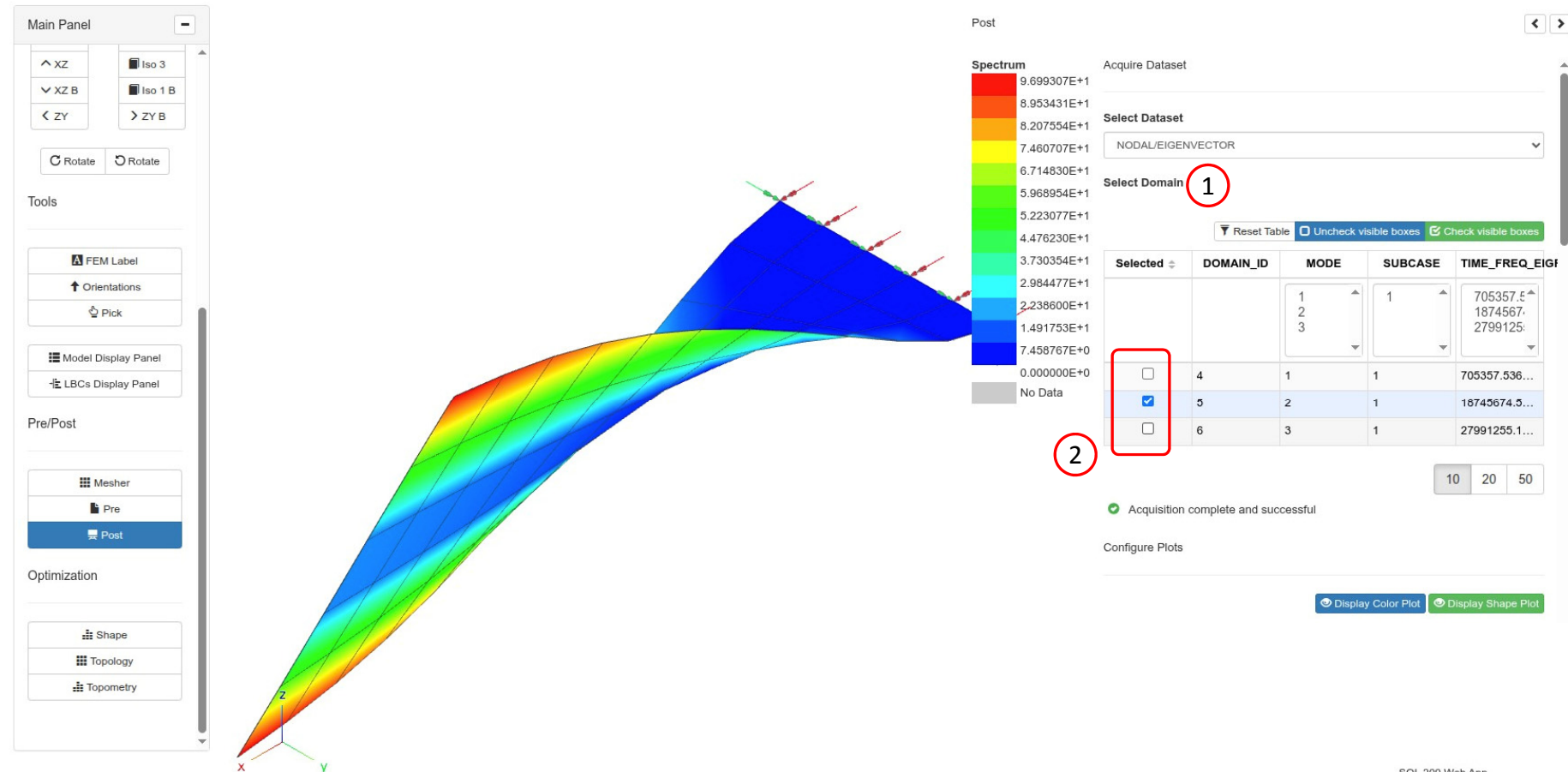
1. After the analysis, the Post panel is automatically opened. The Post panel may be closed or opened by clicking on the indicated button.
2. Vertically scroll to sections Color Plot and Shape Plot
3. Set the Scale Factor to .02
4. The MODE number, SUBCASE ID, eigenvalue (TIME_FREQ_EIGR) and natural frequency (FREQUENCY) are listed



Post

1. Vertically scroll to section Select Domain
2. Select different checkboxes to see the corresponding mode shape

Note that the table displays eigenvalues. There is a goal to find the corresponding natural frequencies.



F06 > List of Natural Frequencies

1. Click Pre
2. Click Run
3. Click Results Files
4. In the left hand side, click model.f06 to display the contents of the file.
5. Vertically scroll until table REAL EIGNEVALUES is displayed.
6. The natural frequencies for modes 1, 2 and 3 are display. Record the following natural frequencies for modes 1, 2, and 3, respectively:
 - 133.6672 Hz, 689.0816 Hz, 842.0373 Hz

Later on these natural frequencies will be used.

A. If needed, the font size may be increased by clicking the indicated button. Alternatively the web browser's zoom functionality may be used.

Main Panel

XY

XY B

XZ

XZ B

ZY

ZY B

ISO 1

Iso 2

Iso 3

Iso 1 B

ZY B

Rotate

Rotate

Tools

FEM Label

↑ Orientations

Pick

Model Display Panel

LBCs Display Panel

Pre/Post

Mesh

Pre

Post

Optimization

Shape

Topology

Topometry

Pre

SOL 200 Web App - Pre

Search

Templates

Model

Bulk Data

Case Control Commands

Advanced

Optimization

Download

Run

Configuration and Run

Results Files

Inspect

Result Files

LOG

model.f06

model.log

terminal_output.log

F04

model.f04

F06

model.f06

Note: Only the last few lines are displayed

MODE NO.	EXTRACTION ORDER	EIGENVALUE	REAL EIGEN RADIANS	IMAGINARY EIGEN CYCLES	GENERALIZED MASS	GENERALIZED STIFFNESS
1	1	7.053575E+05	8.398557E+02	1.336672E+02	1.000000E+00	7.053575E+05
2	2	1.874567E+07	4.329628E+03	6.890816E+02	1.000000E+00	1.874567E+07
3	3	2.799126E+07	5.290676E+03	8.420373E+02	1.000000E+00	2.799126E+07

*** USER INFORMATION MESSAGE 3 (crdb::nastran::Processor::writeOutput)

*** USER INFORMATION MESSAGE (WRITE DATA BLOCK I4 OLAMA, TRAILER[101, 3, 0, 0, 0, 0])

*** USER INFORMATION MESSAGE 3 (crdb::nastran::Processor::writeOutput)

*** USER INFORMATION MESSAGE (WRITE DATA BLOCK I4 OUG1, TRAILER[101, 0, 1728, 0, 0, 0, 2])

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0 SUBCASE 1

**** DBDICT PRINT **** SUBMAP = PRISUM , DMAP STATEMENT NO. 75

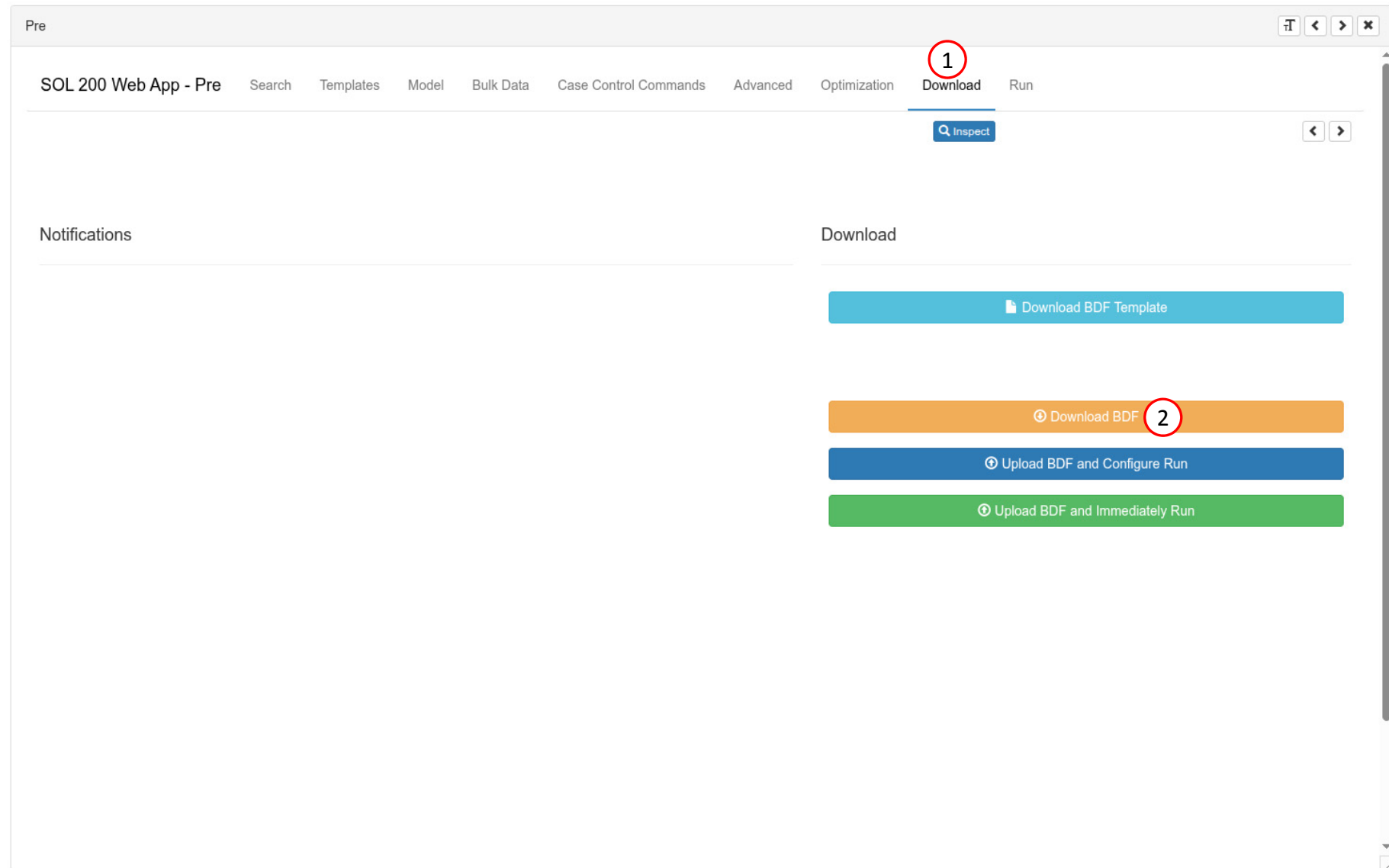
MODE NO.	EXTRACTION ORDER	EIGENVALUE	REAL EIGEN RADIANS	IMAGINARY EIGEN CYCLES	GENERALIZED MASS	GENERALIZED STIFFNESS
1	1	7.053575E+05	8.398557E+02	1.336672E+02	1.000000E+00	7.053575E+05
2	2	1.874567E+07	4.329628E+03	6.890816E+02	1.000000E+00	1.874567E+07
3	3	2.799126E+07	5.290676E+03	8.420373E+02	1.000000E+00	2.799126E+07

*** USER INFORMATION MESSAGE 3 (crdb::nastran::Processor::writeOutput)

Download

1. Click Download
2. Click Download BDF

The Nastran model is now downloaded and saved to your desktop.



Linear Statics Analysis

SOL 101 - Statics

1. Click Advanced
2. Select: 101 - Statics

The screenshot shows the 'SOL 200 Web App - Pre' interface. The 'Advanced' tab is selected in the top navigation bar, indicated by a red circle with the number '1'. Below the navigation bar, the 'Solution Sequence' tab is active, showing 'Select' and 'Configure' sub-tabs. The 'SPC' section contains a 'Display Columns List' button and three buttons: 'Reduce Size of F06', 'Display Description', and 'Reset Table'. The main table has two columns: 'Statement' and 'Select'. The 'Statement' column contains 'SOL'. The 'Select' column contains a list of 'Descriptors'. The first descriptor, '101 - Statics', is highlighted in blue and marked with a red circle and the number '2'. Other descriptors include '103 - Normal modes', '105 - Buckling', '106 - Nonlinear or linear statics', '107 - Direct complex eigenvalues', '108 - Direct frequency response', '109 - Direct transient response', '110 - Modal complex eigenvalues', '111 - Modal frequency response', and '112 - Modal transient response'. At the bottom right, there are buttons for '10', '20', '30', and '40'.

FORCE - Static Force

1. Click Model
2. Click Loads and BCs
3. Click FORCE

Pre

SOL 200 Web App - Pre Search Templates **Model** Bulk Data Case Control Commands Advanced Optimization Download Run

Inspect

Close All

↓ Loads And BCs

Common

- Materials
- Properties
- ↓ Loads And BCs

Specializations

- Aeroelasticity
- Contact
- Dynamics
- Fatigue
- Geometry
- Miscellaneous
- Multipoint Constraints
- Partitioning

Entries Table

- Top
- Middle
- Bottom

Single-point Constraints

SPC1

Enforced Displacements

SPCD SPC

Single-point Constraints Other

FLSYM GRDSET SPCAX SPCOFF SPCOFF1

Free Body Supports

CYSUP SUPAX SUPORT SUPORT1

Nodal

FORCE FORCE1 FORCE2 FORCE1 MOMENT MOMENT1 MOMENT2 SLOAD

Top

Configure FORCE

Batch All Download CSV Upload CSV

Delete	SID	Application Region GROUP_1
	Search	
	Load set identification number. (Integer > 0)	Application region for table GROUP_1
	Integer	

1. Click Create Entry
2. Click the Pick button

Configure FORCE

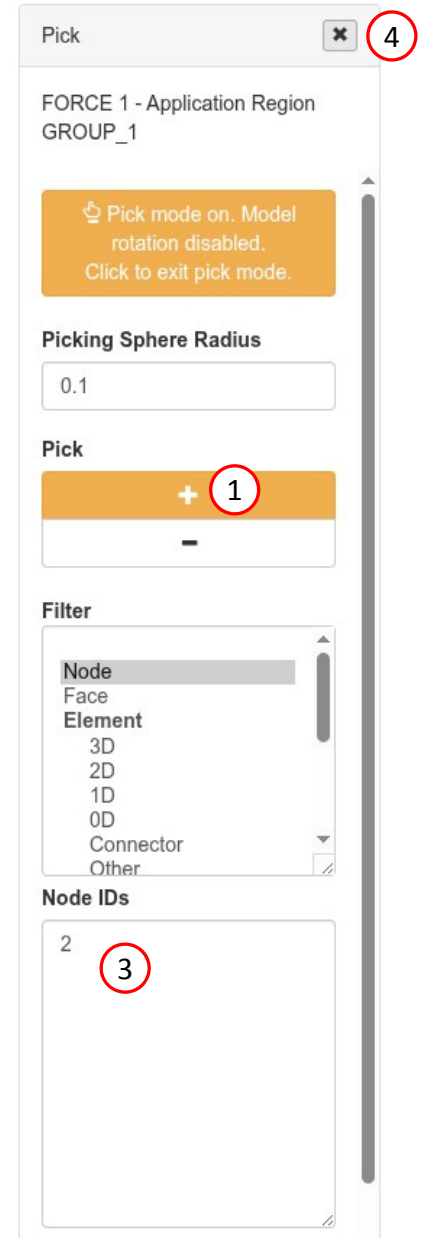
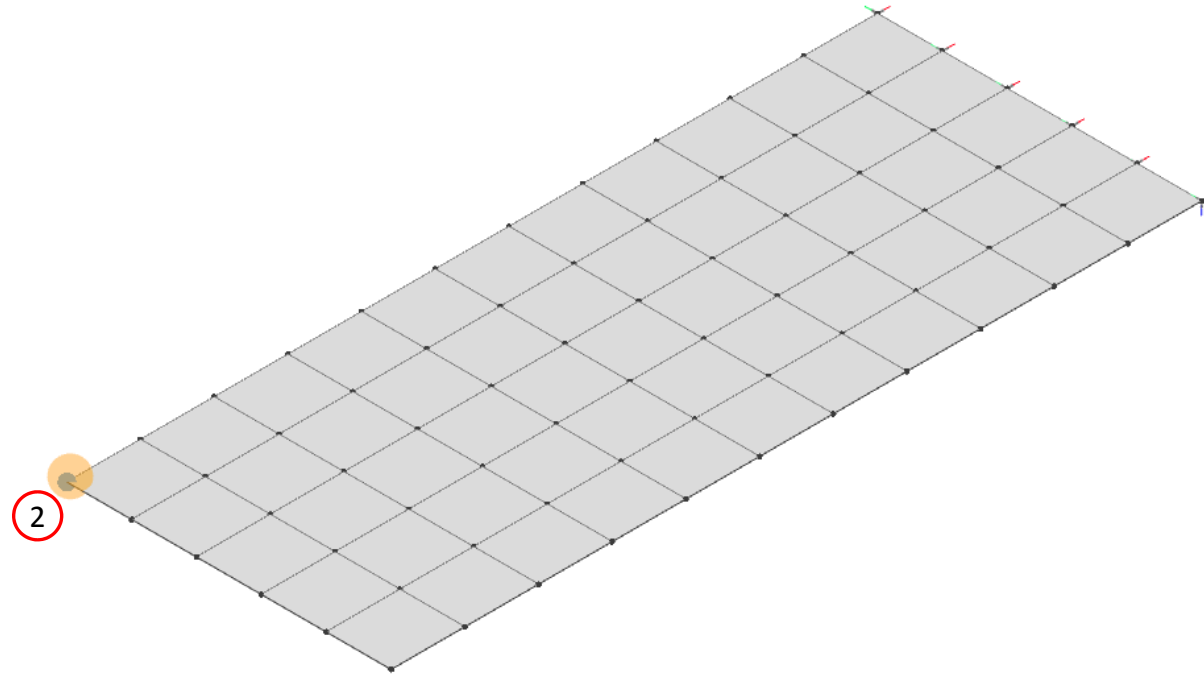
 Upload CSV

+ Create Entry

Add	Delete	Number	G	CID	F
			Search	Search	Search
			Grid point identification number. (Integer > 0)	Coordinate system identification number. (Integer > 0;...	Scale factor. (Real)

FORCE - Static Force

1. Click +
2. Move the mouse cursor to the indicated region. Click and hold the left mouse button, then drag the picking sphere to select
3. The selected node ID is stored
4. Click X



FORCE - Static Force

- 1. The selected node ID is now stored
- 2. Use the horizontal scroll bar to find columns G, CID, F, N1, N2, N3
- 3. Supply the following values
 - In row 1 of the table, supply the following values.
 - F: 1.
 - N3: 1.

Configure FORCE

Batch All

Download CSV

Upload CSV

Reset Table

Create Entry

Delete	SID	Application Region GROUP_1						
	Search							
	Load set identification number. (Integer > 0)	Application region for table GROUP_1						
✖	1	2 1	+ Add Row					
			Add	Delete	Number	G	CID	
						Search	Search	
						Grid point identification number. (Integer > 0)	Coordinate system identification number. (Integer > 0;	
						👤 Integer ⬇	👤 Integer	
			+	✖	1	👤 2	👤 Integer	

2

G	CID	F	N1	N2	N3
Search	Search	Search	Search	Search	Search
Grid point identification number. (Integer > 0)	Coordinate system identification number. (Integer > 0;...	Scale factor. (Real)	Components of a vector measured in coordinate syste...	Components of a vector measured in coordinate syste...	Components of a vector measured in coordinate syste...
👤 Integer ⬇	👤 Integer ⬇	Real ⬇	Real ⬇	Real ⬇	Real ⬇
👤 2	👤 Integer	1.	Real 3	Real	1

PLOAD2 - Uniform Normal Pressure Load on a Surface Element

1. Use the indicated scroll bar to scroll to the right
2. The following section is now visible: Distributed Loads on Surfaces
3. Click PLOAD2

Pre

SOL 200 Web App - Pre Search Templates **Model** Bulk Data Case Control Commands Advanced Optimization Download Run

Inspect

Close All

Common

- Materials
- Properties
- Loads And BCs

Specializations

- Aeroelasticity
- Contact
- Dynamics
- Fatigue
- Geometry
- Miscellaneous
- Multipoint Constraints
- Partitioning

Entries Table

- Top
- Middle
- Bottom

Nodal

- FORCE FORCE1
- FORCE2
- MOMENT MOMENT1
- MOMENT2
- SLOAD

Distributed Loads on Surfaces

- PLOAD
- PLOAD2
- PLOAD4

Distributed Loads on Line Elements

- PLOAD1
- PLOADB3

Axisymmetric

- PLOADX1

Acceleration

- ACCEL ACCEL1
- RFORCE
- GRAV

Thermal

- TEMP
- TEMP1
- TEMP2

Top

Configure PLOAD2

Batch All Download CSV Upload CSV

Delete	SID	P	EID
	Search	Search	Search
	Load set identification number. (Integer > 0)	Pressure value. (Real)	Element identification number. (Integer > 0 or blank; for the "THRU"

PLOAD2 - Uniform Normal Pressure Load on a Surface Element

1. Click Create Entry
2. Supply the following values
 - P: 0.1
3. Click Pick

Top

Configure PLOAD2

 Batch All

 Reset Table

 1
+ Create Entry

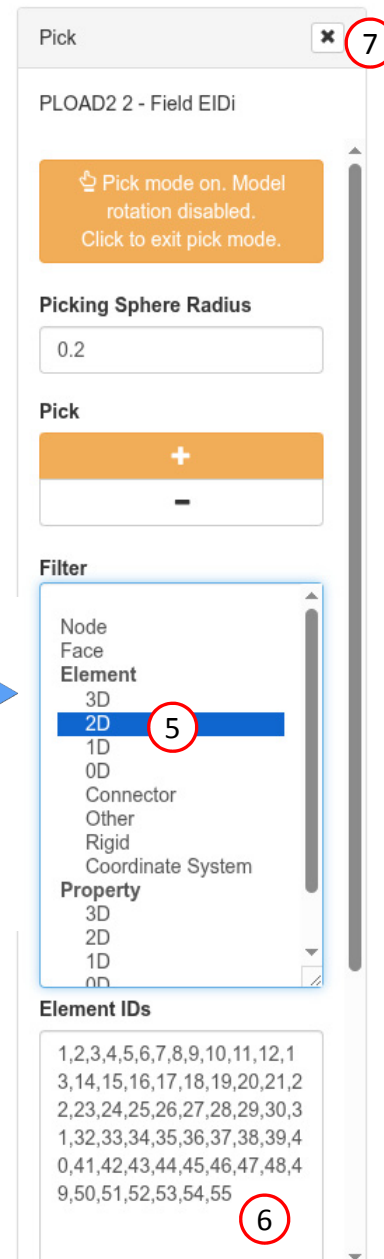
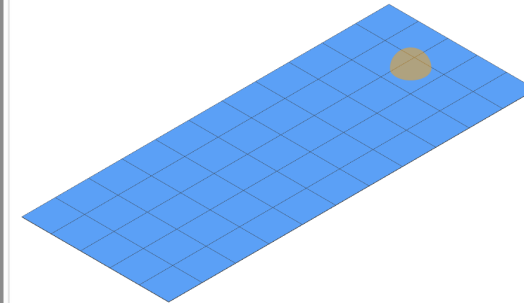
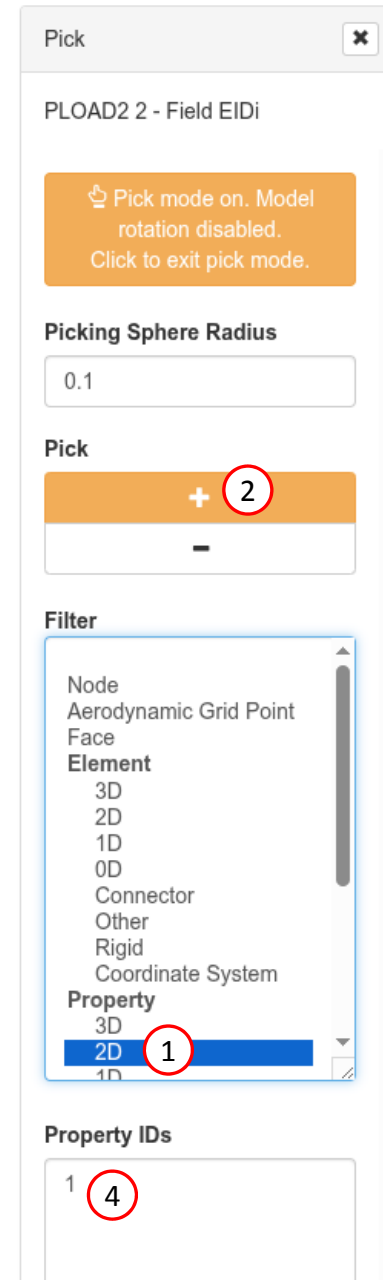
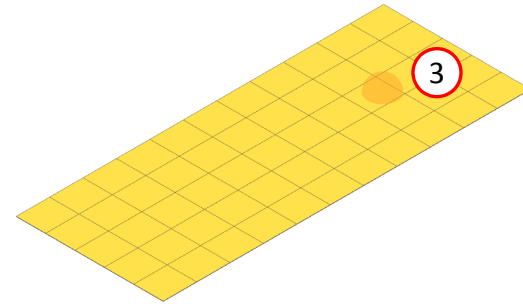
 Download CSV

 Upload CSV

Delete	SID	P	EIDi
	Search	Search	Search
	Load set identification number. (Integer > 0)	Pressure value. (Real)	Element identification number. (Integer > 0 or blank; for the "THRU" option, EID1 < EID2.)
	Integer 	Real 	 
	2	0.1 2	 3

PLOAD2 - Uniform Normal Pressure Load on a Surface Element

1. Set Filter to Property > 2D
2. Click +
3. Move the mouse cursor to the indicated region. Click and hold the left mouse button, then drag the picking sphere to select.
4. The selected property ID is stored
5. Change Filter to Element > 2D
6. The element IDs associated with PSHELL ID=1 are automatically determined and stored
7. Click X



BDF Output

1. The selected element IDs are now stored
2. Use the indicated buttons to display the BDF Output section
3. The actual text of the bulk data entry is displayed.
4. Use the indicated buttons to hide the BDF Output section
5. Click X

The BDF Output section is ideal for learning and debugging MSC Nastran models. Any changes made in the interface are immediately updated in the BDF Output section.

SOL 200 Web App - Pre

Search Templates Model Bulk Data Case Control Commands Advanced Optimization Download Run

Inspect

Close All

↓ Loads And BCs

Single-point Constraints Enforced Displacements Single-point Constraints Other Free Body Supports

Common

Materials Properties Loads And BCs

Specializations

Aeroelasticity Contact Dynamics Fatigue Geometry Miscellaneous Multipoint Constraints Partitioning

Entries Table

Top Middle Bottom

Configure PLOAD2

Batch All Reset Table Create Entry

Download CSV Upload CSV

Delete	SID	P	EID
	Search	Search	Search
	Load set identification number. (Integer > 0)	Pressure value. (Real)	Element identification number. (Integer > 0 or blank; for the "THRU" option, EID1 < EID2.)
	Integer	Real	
X	2	0.1	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,36,37,38,39,40,41,42,43,44,45,46,47,48,49,50,51,52,53,54,55

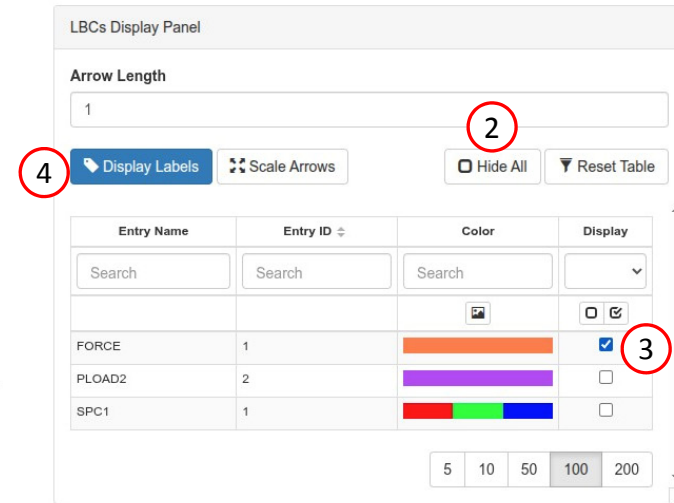
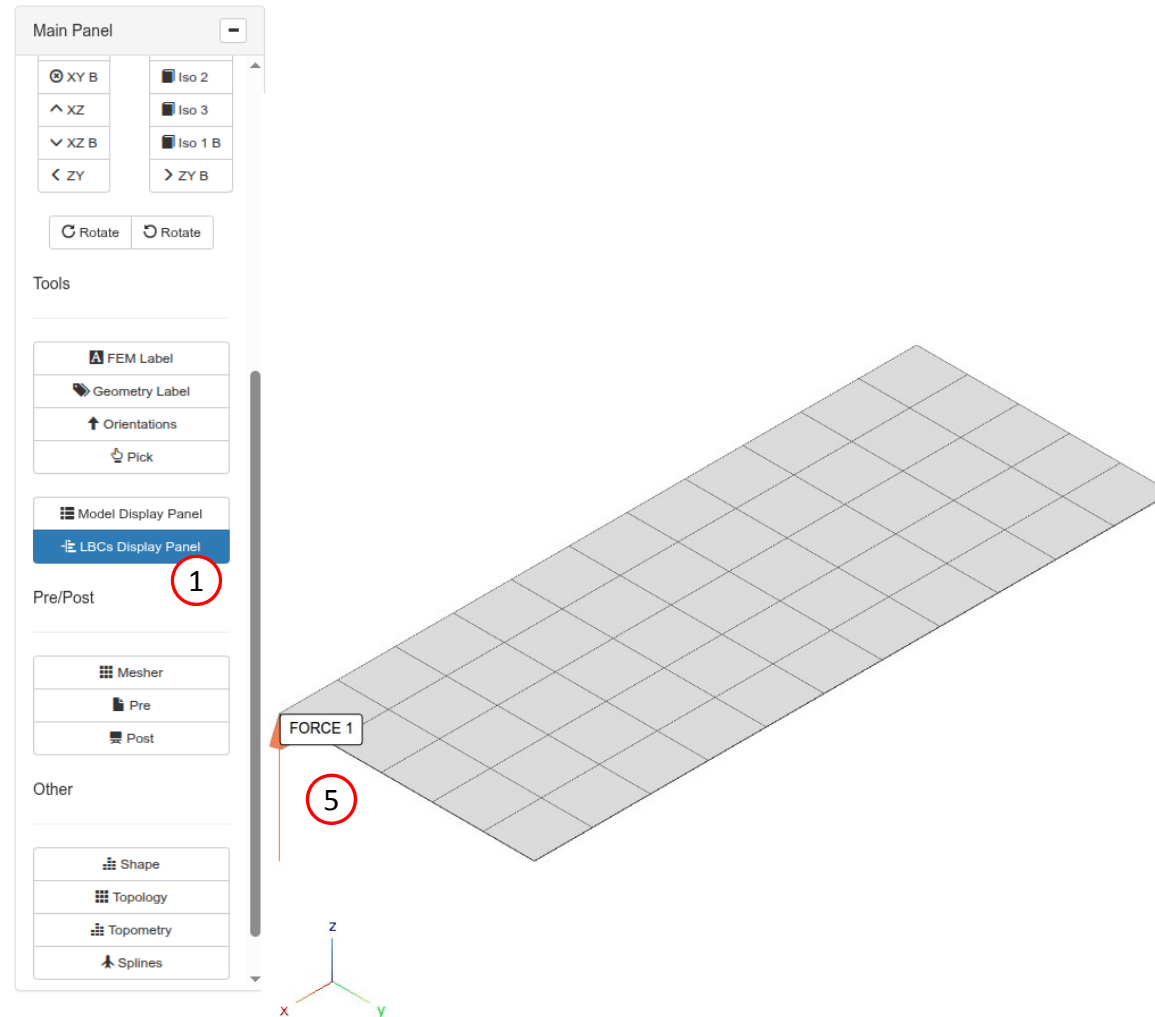
BDF Output

\$	1	2	3	4	5	6	7	8	9
PLOAD2	2	0.1	1	2	3	4	5	6	
	7	8	9	10	11	12	13	14	
	15	16	17	18	19	20	21	22	
	23	24	25	26	27	28	29	30	
	31	32	33	34	35	36	37	38	
	39	40	41	42	43	44	45	46	
	47	48	49	50	51	52	53	54	
	55								

Developed by The Engineering Lab

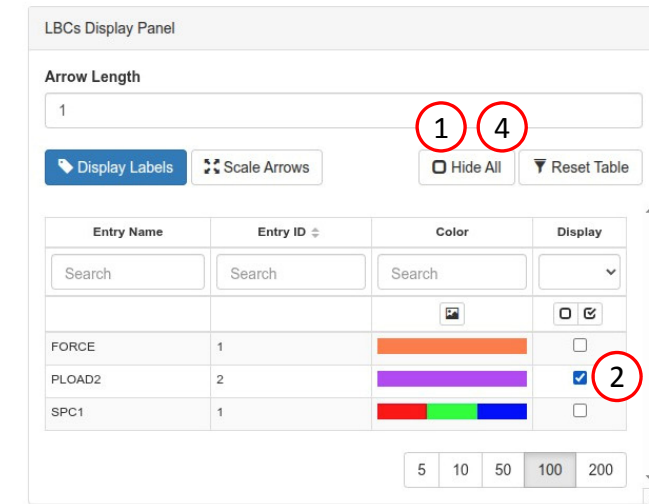
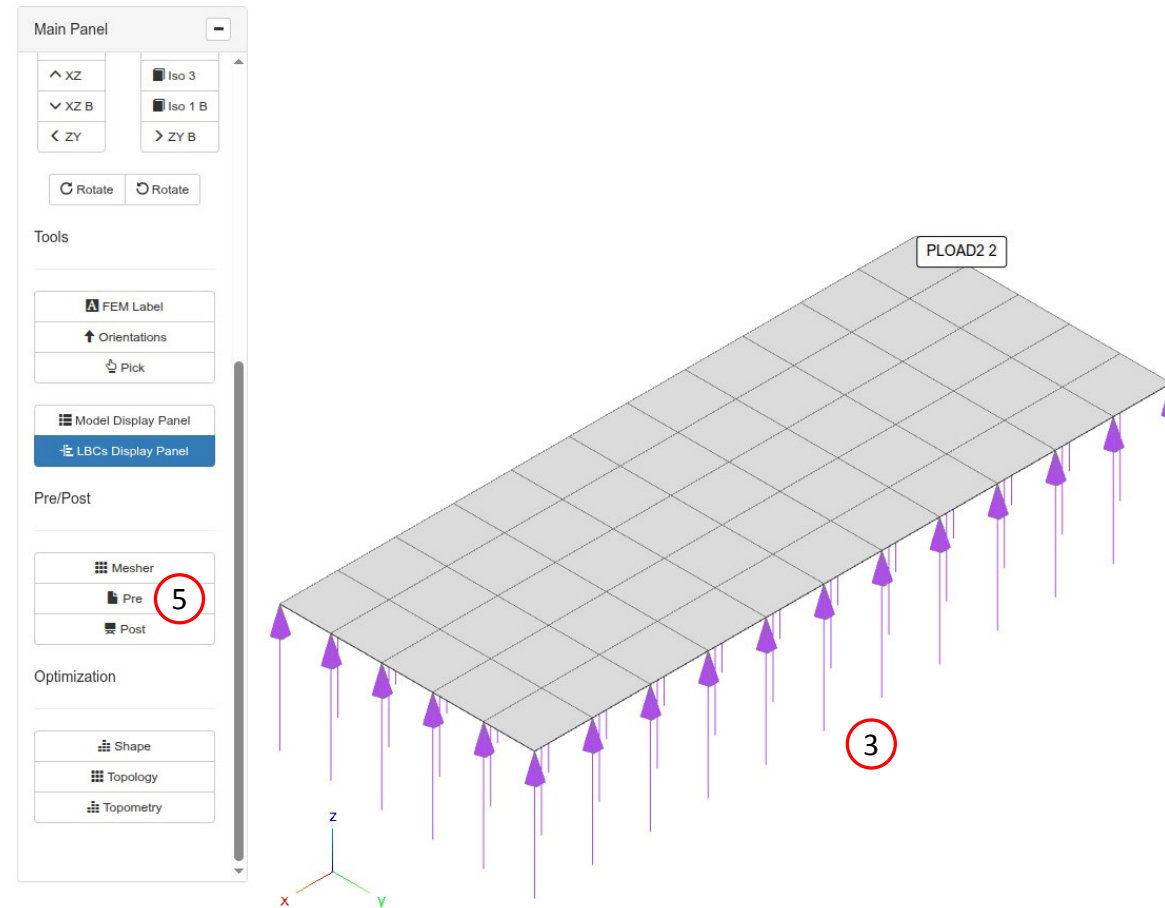
LBCs Display Panel

1. Click LBCs Display Panel
2. Click Hide All
3. Mark the checkbox for Entry Name=FORCE and Entry ID=1
4. Click Display Labels
5. Inspect the load



LBCs Display Panel

1. Click Hide All
2. Mark the checkbox for Entry Name=PLOAD2 and Entry ID=2
3. Inspect the load
4. Click Hide All
5. Click Pre



Subcases

1. Click Case Control Commands
2. Click Subcases
3. Use the indicated buttons to display the BDF Output section
4. The actual text of the case control section is displayed
5. Click Add to add a new subcase
6. Click Renumber Subcase IDs
 - Subcase identification numbers must be in ascending order
7. The case control section is immediately updated with any change

The screenshot shows the 'SOL 200 Web App - Pre' interface. The 'Case Control Commands' tab is selected. The 'Subcases' sub-tab is active, showing a table with two subcases. The 'BDF Output' section is visible on the right.

Case Control Commands

Subcases

↓↑ Renumber Subcase IDs

Add	Subcase Delimiter	Subcase Number	Subtitle	Analysis	Delete
					
	SUBCASE	1			
	SUBCASE	2			

10 20 30 40 50

BDF Output

```
$ 1 || 2 || 3 || 4 || 5 || 6 || 7 ||
ECHO=NONE
$ Dynamic Solution Conditions
METHOD=1
$ Physical Set Output Requests
DISPLACEMENT (PLOT) =ALL
$ Loads and BCs
SPC=1
SUBCASE 1
SUBCASE 2
```

Developed by The Engineering Lab

SPC - Single Point Constraint Set Selection

- 1. Click Loads and BCs
- 2. Select row SPC
- 3. Confirm SPC ID=1 is assigned to the Above Subcase column

SOL 200 Web App - Pre

Search

Templates

Model

Bulk Data

Case Control Commands

Advanced

Optimization

Download

Run

Subcases

Loads and BCs

Commands

Parameters

Inspect

Navigate

Assign

Display Descriptions

Selected	Open	Name
		Constraints
		AUTOSPC
		AXISYMMETRIC
		BC
		DSYM
		MPC
		SPC

BDF Output

\$ 1 || 2 || 3 || 4 || 5 || 6 || 7 ||

ECHO=NONE

\$ Dynamic Solution Conditions

METHOD=1

\$ Physical Set Output Requests

DISPLACEMENT (PLOT) =ALL

\$ Loads and BCs

SPC=1

SUBCASE 1

SUBCASE 2

SOL 200 Web App - Pre

Search

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Subcases

Loads and BCs

Commands

Parameters

Inspect

Navigate

Assign

Display Columns List

Display Selected

Reset Table

Uncheck visible boxes

Check visible boxes

Entry	ID	Above Subcase	SUBCASE 1	SUBCASE 2
SPC1	1			

BDF Output

\$ 1 || 2 || 3 || 4 || 5 || 6 || 7 ||

ECHO=NONE

\$ Dynamic Solution Conditions

METHOD=1

\$ Physical Set Output Requests

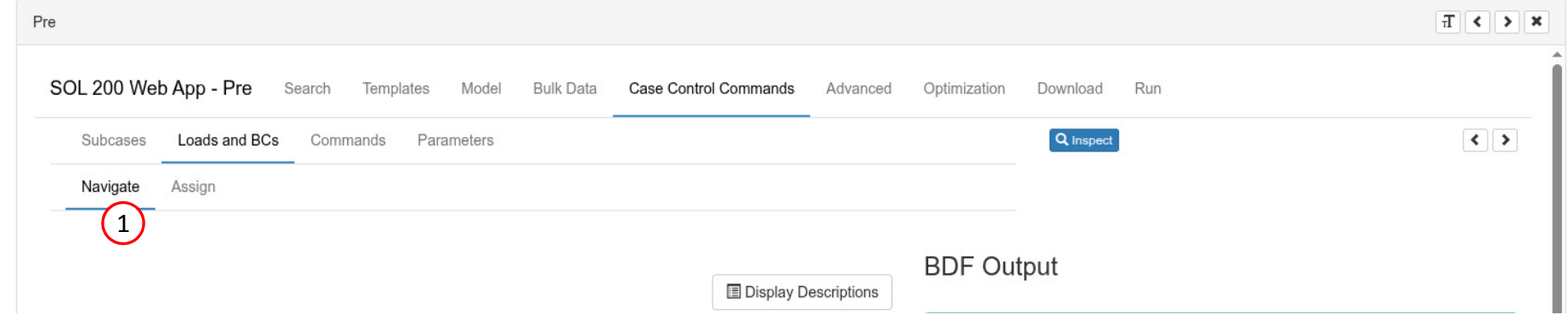
DISPLACEMENT (PLOT) =ALL

\$ Loads and BCs

SPC=1

LOAD - External Static Load Set Selection

- 1. Click Navigate
- 2. Select row LOAD
- 3. Assign FORCE ID=1 to SUBCASE 1.
- 4. Assign PLOAD2 ID=2 to SUBCASE 2.



Static Loads		
		CLOAD
		DEFORM
		LOAD 2
		LOADTYPE

SOL 200 Web App - Pre

Search

Templates

Model

Bulk Data

Case Control Commands

Advanced

Optimization

Download

Run

Subcases

Loads and BCs

Commands

Parameters

Navigate

Assign

Display Columns List

Display Selected

Reset Table

Uncheck visible boxes

Check visible boxes

Entry	ID	Above Subcase		SUBCASE 1		SUBCASE 2	
		1.0		1.0		1.0	
FORCE	1	☐	1.0	☒ 3	1.0	☐	1.0
PLOAD2	2	☐	1.0	☐	1.0	☒ 4	1.0

BDF Output

\$ 1 || 2 || 3 || 4 || 5 || 6 || 7 ||

ECHO=NONE

\$ Dynamic Solution Conditions

METHOD=1

\$ Physical Set Output Requests

DISPLACEMENT (PLOT)=ALL

\$ Loads and BCs

SPC=1

SUBCASE 1

\$ Loads and BCs

LOAD=1

SUBCASE 2

Stress Output

1. Click Commands
2. Search the table for stress
3. Select the indicated checkbox

Pre

SOL 200 Web App - Pre Search Templates Model Bulk Data Case Control Commands Advanced Optimization Download Run

Subcases Loads and BCs Commands Parameters

Select Configure

Display Columns List Display Description Display Selected Reset Table

Command	Above Subcase	SUBCASE 1	SUBCASE 2
stress			
GPSTRESS	☐	☐	☐
NLSTRESS	☐	☐	☐
STRESS	☒	☐	☐

10 20 30 40 50

BDF Output

```
$ 1 || 2 || 3 || 4 || 5 || 6 || 7 ||
ECHO=NONE
$ Dynamic Solution Conditions
METHOD=1
$ Physical Set Output Requests
DISPLACEMENT (PLOT) =ALL
STRESS=ALL
$ Loads and BCs
SPC=1
SUBCASE 1
$ Loads and BCs
LOAD=1
SUBCASE 2
$ Loads and BCs
LOAD=2
```

Developed by The Engineering Lab

Stress Output

1. Click Configure
2. Click Reduce Size of F06
 - This option automatically adds ECHO=NONE and selects the PLOT descriptor for the commands. This option significantly reduces the size of the F06 file.

The Configure section provides complete access to configuring case control commands.

The screenshot shows the 'SOL 200 Web App - Pre' interface. The top navigation bar includes 'Search', 'Templates', 'Model', 'Bulk Data', 'Case Control Commands' (active), 'Advanced', 'Optimization', 'Download', and 'Run'. Below this, there are tabs for 'Subcases', 'Loads and BCs', 'Commands', and 'Parameters'. The 'Commands' tab is active, and the 'Configure' sub-tab is selected. A red circle '1' highlights the 'Configure' sub-tab, and a red circle '2' highlights the 'Reduce Size of F06' button. The interface includes buttons for 'Display Columns List', 'Reduce Size of F06', 'Display Description', and 'Reset Table'. A table with columns 'Command', 'Above Subcase', and 'SUBCASE 1' is displayed. The 'Command' column has a search bar. The 'Above Subcase' column has a dropdown menu for 'Option Right of Equal Sign' set to 'ALL'. The 'SUBCASE 1' column has a dropdown menu for 'Descriptors' with 'PLOT' selected. The 'SUBCASE 2' column has a dropdown menu for 'Descriptors' with 'NONE' selected. A 'BDF Output' window is open on the right, showing the output of the commands. The output includes sections for 'Dynamic Solution Conditions', 'Physical Set Output Requests', 'Loads and BCs', 'SUBCASE 1', and 'SUBCASE 2'. The output is displayed in a monospaced font with a green border. At the bottom of the BDF Output window, it says 'Developed by The Engineering Lab'.

Command	Above Subcase	SUBCASE 1
DISPLACEMENT	Descriptors SORT1 SORT2 PRINT PUNCH PLOT ODS REAL IMAG PHASE PSDF ATOC	
ECHO	Descriptors SORT EXCEPT cdni UNSORT BOTH NONE PUNCH FILE	

```
$ 1 || 2 || 3 || 4 || 5 || 6 || 7 ||
ECHO=NONE
$ Dynamic Solution Conditions
METHOD=1
$ Physical Set Output Requests
DISPLACEMENT (PLOT)=ALL
STRESS (PLOT)=ALL
$ Loads and BCs
SPC=1
SUBCASE 1
$ Loads and BCs
LOAD=1
SUBCASE 2
$ Loads and BCs
LOAD=2
```

Developed by The Engineering Lab

Run

1. Click Download
2. Click Upload BDF and Immediately Run

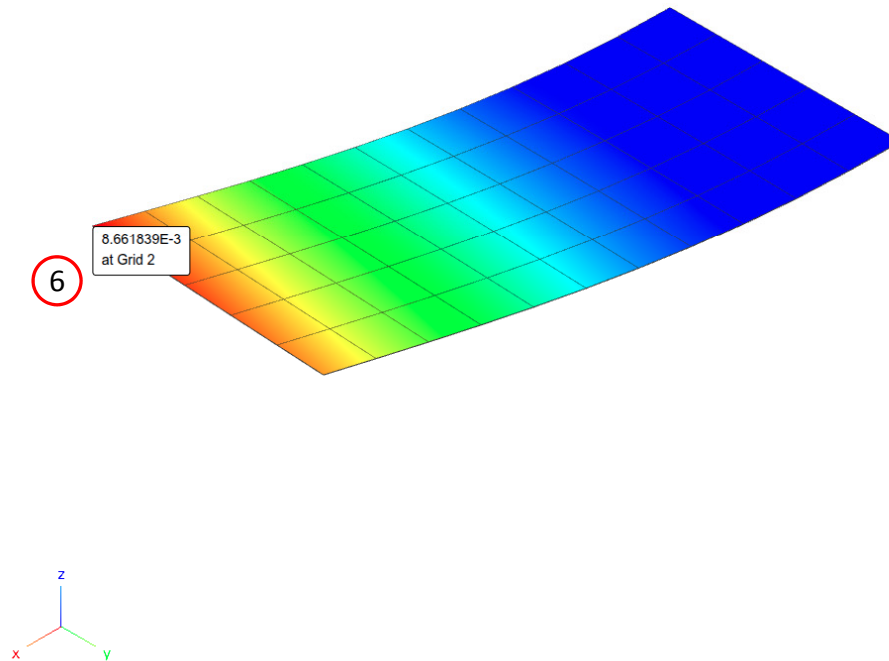
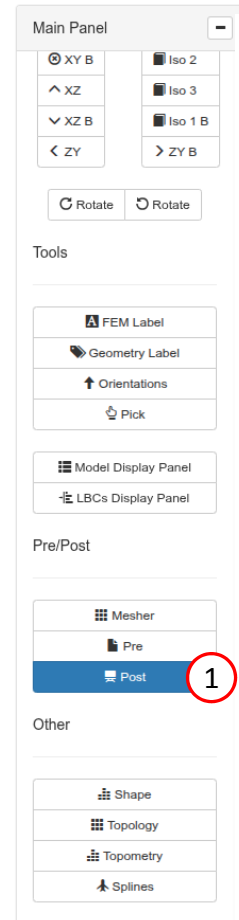
The screenshot shows the 'SOL 200 Web App - Pre' interface. The top navigation bar includes 'Search', 'Templates', 'Model', 'Bulk Data', 'Case Control Commands', 'Advanced', 'Optimization', 'Download' (circled with a red '1'), and 'Run'. Below the navigation bar is an 'Inspect' button. The main content area is divided into three sections: 'Notifications', 'Download', and 'BDF Output'. The 'Download' section contains four buttons: 'Download BDF Template', 'Download BDF', 'Upload BDF and Configure Run', and 'Upload BDF and Immediately Run' (circled with a red '2'). The 'BDF Output' section displays a text area with the following content:

```
$ 1 || 2 || 3 || 4 || 5 || 6 || 7 |
SOL 101
CEND
ECHO=NONE
$ Dynamic Solution Conditions
METHOD=1
$ Physical Set Output Requests
DISPLACEMENT (PLOT) =ALL
STRESS (PLOT) =ALL
$ Loads and BCs
SPC=1
SUBCASE 1
$ Loads and BCs
LOAD=1
SUBCASE 2
$ Loads and BCs
LOAD=2
BEGIN BULK
[...]
ENDDATA
```

Developed by The Engineering Lab

Post

1. After the analysis, the Post panel is automatically opened. The Post panel may be closed or opened by clicking on the indicated button.
2. Vertically scroll to section Configure Plots
3. Set the Scale Factor to 100.0
4. The SUBCASE ID and maximum deflection are display
5. Select the first maximum label
6. A label displays the location and the maximum displacement



Post

1. Vertically scroll to section Select Domain
2. Select different checkboxes to see the corresponding deformation.

When performing normal modes analysis, the perturbed shape is a eigenvector/mode shape.

When performing statics analysis, the perturbed shape is a deformation.

Students often use 'displacement' to refer to 'mode shapes' and is incorrect. The terms have different meaning and should be used appropriately.

Main Panel

Tools

Pre/Post

Other

Post

Spectrum

Acquire Dataset

Select Dataset

Select Domain

Selected	DOMAIN_ID	SUBCASE
	1	1
☒	2	2

Export GLB

Color Plot

Shape Plot

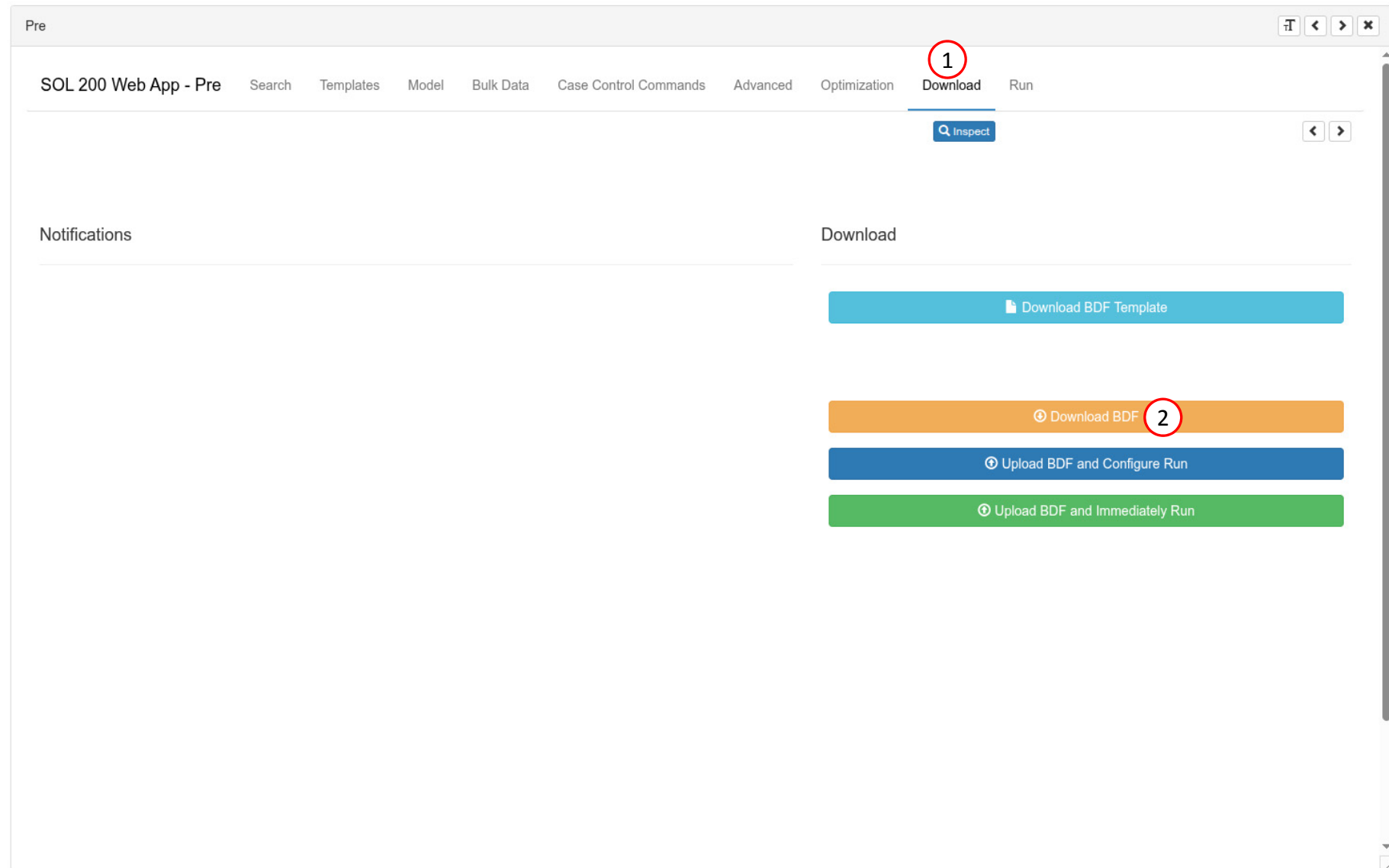
Dataset

SOL 200 Web App
Developed by The Engineering Lab

Download

1. Navigate to Pre > Download
2. Click Download BDF

The Nastran model is now downloaded and saved to your desktop.



Saving Progress

Saving Progress

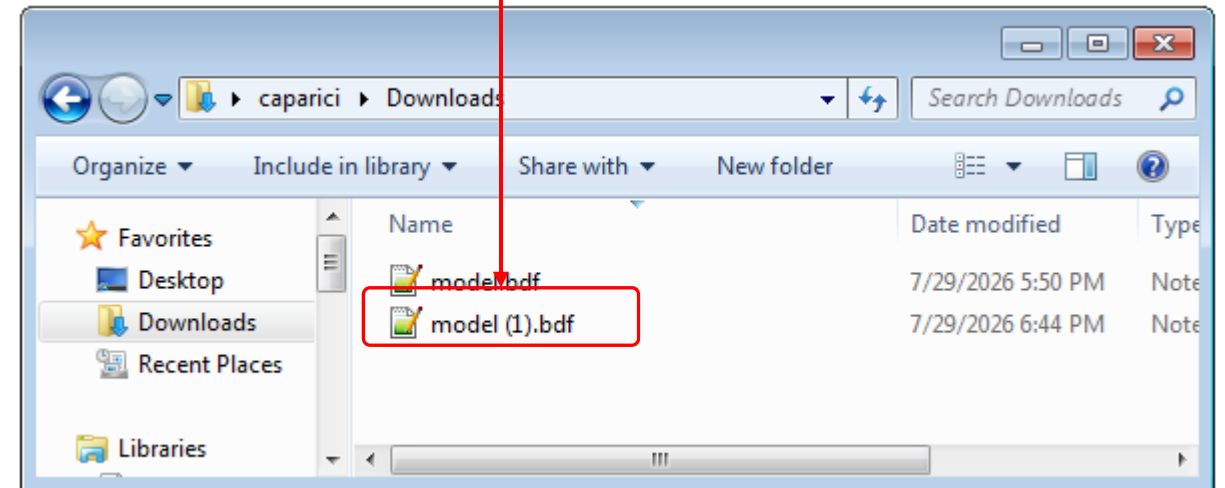
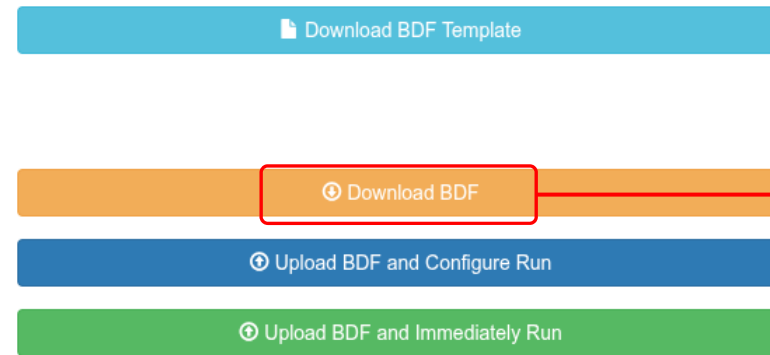
The bulk data file (.bdf or BDF) contains the Nastran model and is critical to any Nastran analysis.

All work is saved or opened from this bulk data file.

1. When the button Download BDF is clicked, a .bdf file is saved to your desktop.

Keep these files in a safe location.

Download



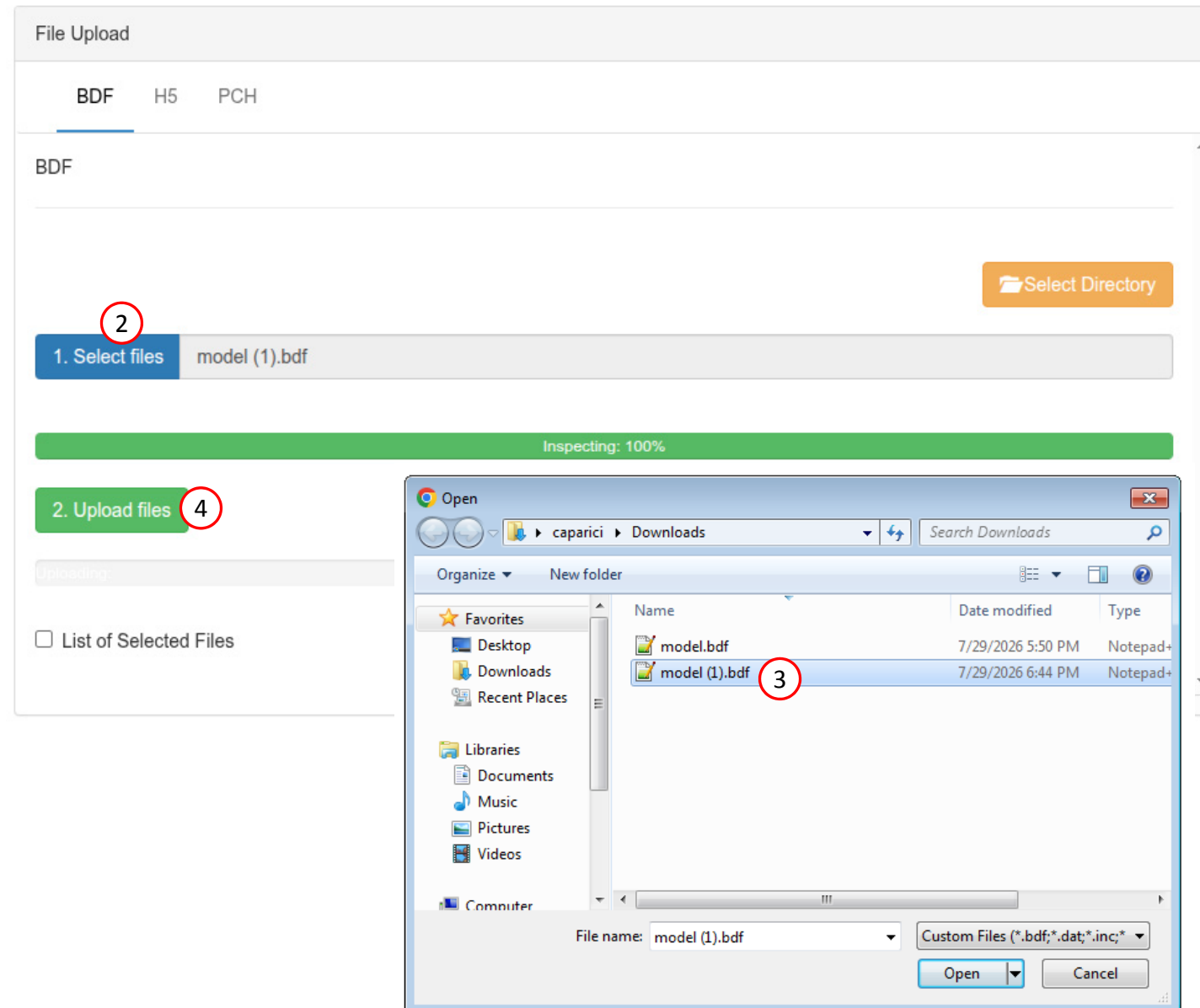
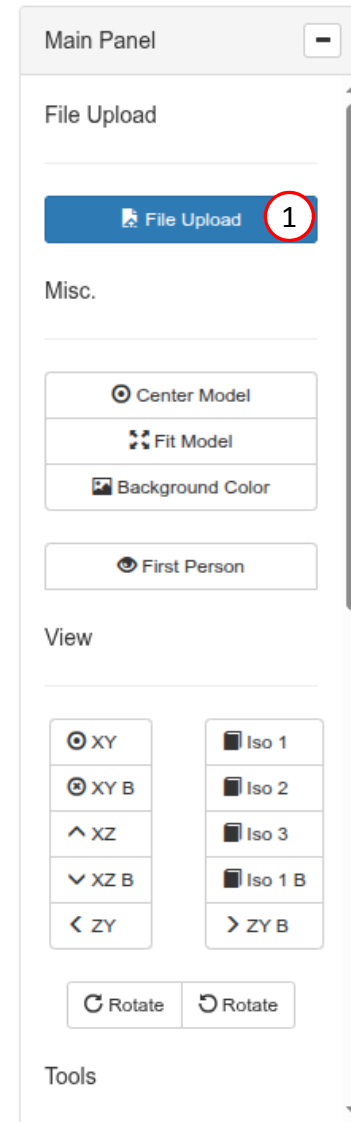
Open the Viewer

1. Click on the indicated link



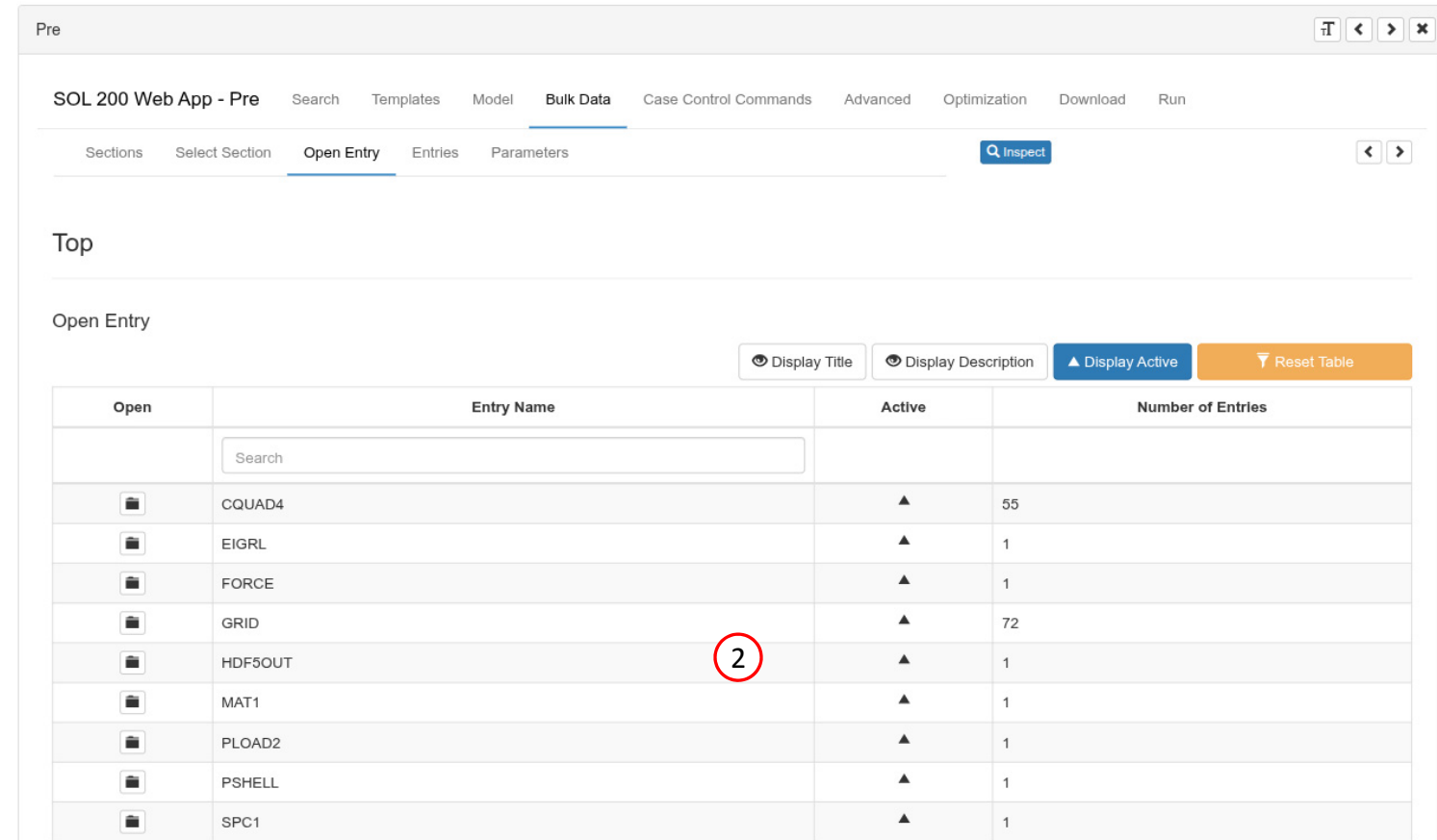
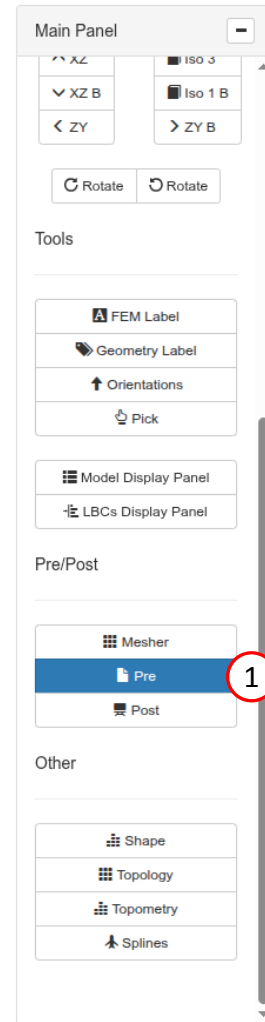
Opening a saved .bdf file

1. Click File Upload
2. Click Select files
3. Select a .bdf file
 - Example: File model (1).bdf contains the configuration for the linear statics analysis.
4. Click Upload files



Opening a saved .bdf file

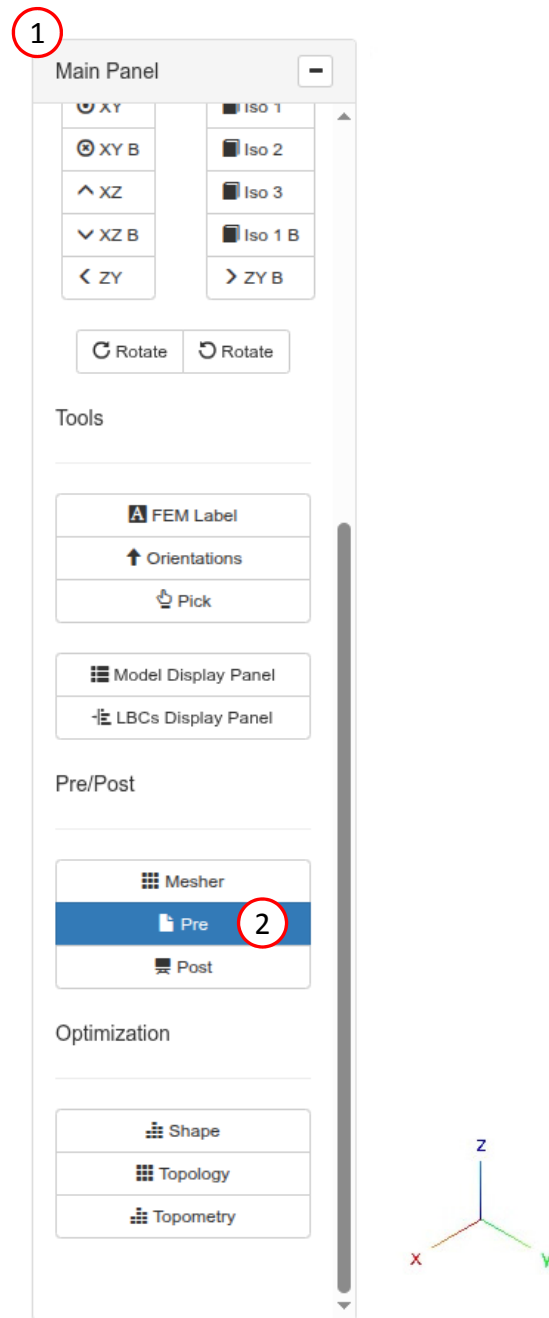
1. Click Pre
2. The previously saved .bdf is now imported to the web app



Frequency Response Analysis

Pre

1. Refer to the Main Panel
2. Click Pre



Template

1. Click Templates
2. Locate the row for SOL 111 or Modal Frequency Response Analysis
3. Click Preview Template
4. A preview is displayed of the bulk data file that contains a configuration for a normal modes analysis
5. Click Apply Template

Pre

SOL 200 Web App - Pre Search **Templates** Model Bulk Data Case Control Commands Advanced Optimization Download Run

Inspect

Reset Table

Analysis Templates

Solution Sequence	Category	Description	Preview Template
Search	Search	Search	
101	Statics	Statics	Preview Template
103	Dynamics	Normal modes	Preview Template
105	Buckling	Buckling	Preview Template
111	Dynamics	Modal Frequency Response Analysis	Preview Template
144	Aeroelasticity	Static Aeroelastic Analysis	Preview Template

5 10 20 50

Reset Table

User Defined Templates

Solution Sequence	Category	Description	Preview Template
Search	Search	Search	
101	Statics	Statics with inertia relief	Preview Template
101	Statics	Statics with inertia relief, Version B	Preview Template

5 10 20 50

Apply Template

```
$ Modal Frequency Response Analysis
$ Category: Dynamics
SOL 111
CEND
SET 1 = {PH}
$ Output Control
ECHO=NONE
$ Dynamic Solution Conditions
FREQUENCY=1
METHOD=1
$ Physical Set Output Requests
DISPLACEMENT (SORT2, PHASE)=1
SUBCASE 1
BEGIN BULK
PARAM COUPMASS -1
PARAM WTMASS 1.0
EIGRL 1 10
FREQ1 1 0. 10. 100
HDF5OUT INPUT NO
RLOAD2 1
ENDDATA
```

RLOAD2 - Frequency Response Dynamic Excitation, Form 2

1. Click Model
2. Click Dynamics
3. Click RLOAD2
4. Click TABLED1

Pre

SOL 200 Web App - Pre Search Templates **Model** Bulk Data Case Control Commands Advanced Optimization Download Run

Inspect

Close All

Dynamics

Common

- Materials
- Properties
- Loads And BCs

Specializations

- Aeroelasticity
- Contact
- Dynamics**
- Fatigue
- Geometry
- Miscellaneous
- Multipoint Constraints
- Partitioning

Entries Table

- Top
- Middle
- Bottom

Tables

TABLED1 TABLED2
TABLED3 TABLED4
TABLED5
TABRND1

Eigenvalue Extraction

EIGC EIGR
EIGRL EIGP

Excitation Frequencies

FREQ FREQ1
FREQ2 FREQ3
FREQ4 FREQ5

Dynamic Loads

ACSRCE RLOAD1
RLOAD2
DELAY DPHASE
TLOAD1 TLOAD2

Random

RANDPS RANDT1

Damp

TAB
HYB

Top

Configure RLOAD2

Batch All

Download CSV Upload CSV

Delete	SID	EXCITEID	DELAYI/DELAYR	DPHASEI/DPHASER	TB/RB	
	Search	Search	Search	Search	Search	Search
	Set identification number. (Integer > 0)	Identification number of a static or thermal load set or a DAR...	DELAYI: Identification number of DELAY or FBADLAY (in FR...	DPHASEI: Identification number of DPHASE or FBAPHAS (in FR...	TB: Set identification number of the TABLEDi entry that gives...	TP: Set identification number of the TABL...
	Integer		Real	Real	Real	
x	1		Real	Real	Real	

RLOAD2 - Frequency Response Dynamic Excitation, Form 2

1. The table of RLOAD2 entries is now visible
2. The table of TABLED1 entries is also visible
3. Use the indicated scroll bar to view both tables

Top

Configure RLOAD2

1

Batch All
Download CSV
Upload CSV
Reset Table
Create Entry

Delete	SID	EXCITEID	DELAY/DELAYR	DPHASE/DPHASER	TB/RB	TP/RP	TYPE	
	Search	Search	Search	Search	Search	Search	Search	
	Set identification number. (Integer > 0)	Identification number of a static or thermal load set or a DAR...	DELAYI: Identification number of DELAY or FBADLAY (in FR...	DPHASEI: Identification number of DPHASE or FBAPHAS (in FR...	TB: Set identification number of the TABLEDi entry that gives...	TP: Set identification number of the TABLEDi entry that gives...	Defines the type of the dynamic excitation. (Integer, character ...	
	Integer		Real	Real	Real	Real		
✖	1		Real	Real	Real	Real		Lower Bound 0

1
0.5
0

3

Middle

Configure TABLED1

2

Batch All
Download CSV
Upload CSV
Reset Table
Create Entry

Delete	TID	XAXIS	YAXIS	GROUP_1	Plot
	Search	Search	Search		
	Table identification number. (Integer > 0)	Specifies a linear or logarithmic interpolation for the x-axis. See QRG for additional remarks. (Character: "LINEAR" or "LOG"; Default = "LINEAR")	Specifies a linear or logarithmic interpolation for the y-axis. See QRG for additional remarks. (Character: "LINEAR" or "LOG"; Default = "LINEAR")		
	Integer				

TABLED1 - Dynamic Load Tabular Function, Form 1

1. Scroll to the table of TABLED1 entries
2. Click Create Entry
3. Horizontally scroll until column GROUP_1 is visible
4. Click Add Row twice.
5. For row 1, supply the following values:
 - xi: 10.
 - yi: 1.
6. For row 2, supply the following values:
 - xi: 1000.
 - yi: 1.
7. The column Plot displays the interpolation function based on the supplied points (xi, yi).

Middle

Configure TABLED1 1

Batch All Download CSV Upload CSV Reset Table + Create Entry 2

YAXIS	GROUP_1	Plot																														
irch																																
files a linear or logarithmic relation for the y-axis. Se...																																
	+ Add Row Download CSV File Upload CSV File <table border="1"> <thead> <tr> <th>Add</th> <th>Delete</th> <th>Number</th> <th>xi</th> <th>yi</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td></td> <td>Search</td> <td>Search</td> </tr> <tr> <td></td> <td></td> <td></td> <td>Tabular values. (Real)</td> <td>Tabular values. (Real)</td> </tr> <tr> <td></td> <td></td> <td></td> <td>Real</td> <td>Real</td> </tr> <tr> <td>+</td> <td>×</td> <td>1</td> <td>10.</td> <td>1.</td> </tr> <tr> <td>+</td> <td>×</td> <td>2</td> <td>1000.</td> <td>1.</td> </tr> </tbody> </table>	Add	Delete	Number	xi	yi				Search	Search				Tabular values. (Real)	Tabular values. (Real)				Real	Real	+	×	1	10.	1.	+	×	2	1000.	1.	
Add	Delete	Number	xi	yi																												
			Search	Search																												
			Tabular values. (Real)	Tabular values. (Real)																												
			Real	Real																												
+	×	1	10.	1.																												
+	×	2	1000.	1.																												

10 20 50 100 200

3

RLOAD2 - Frequency Response Dynamic Excitation, Form 2

1. Scroll to the table of RLOAD2 entries
2. Supply the following values
 - EXCITEID: FORCE - 1
 - DPHASEI/DPHASER: -45.
 - TB/RB: Click the toggle button once, then select option: TABLED1 - 1

Note the previous TABLED1 entry is now used by the RLOAD2 entry.

3. Click Create Entry
4. Vertically scroll down until the second row containing the second RLOAD2 entry is found.
5. Supply the following values
 - EXCITEID: PLOAD2 - 2
 - TB/RB: Click the toggle button once, then select option: TABLED1 - 1

Top

Configure RLOAD2

1

Batch All

Reset Table

3

Create Entry

Download CSV

Upload CSV

Delete	SID	EXCITEID	DELAYI/DELAYR	DPHASEI/DPHASER	TB/RB	TP/F
	Search	Search	Search	Search	Search	Search
	Set identification number. (Integer > 0)	Identification number of a static or thermal load set or a DAR...	DELAYI: Identification number of DELAY or FBADLAY (in FR...	DPHASEI: Identification number of DPHASE or FBAPHAS (in FR...	TB: Set identification number of the TABLEDi entry that gives...	TP: Set identifica the TABLEDi entr
	Integer		Real	Real	Real	Real
	1	FORCE - 1	Real	-45.	TABLED1 - 1	Real

2

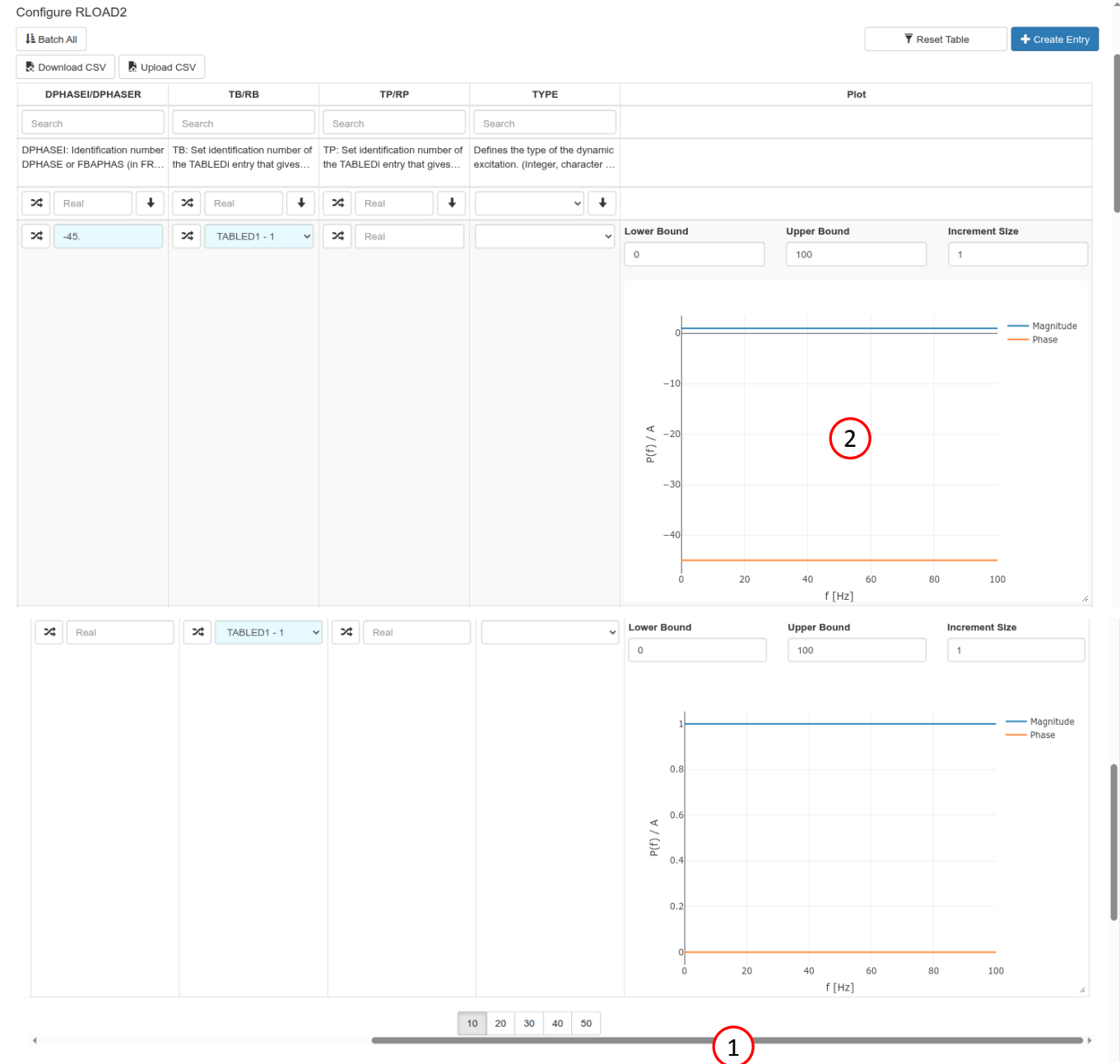
	2	PLOAD2 - 2	Real	Real	TABLED1 - 1	Real

4

5

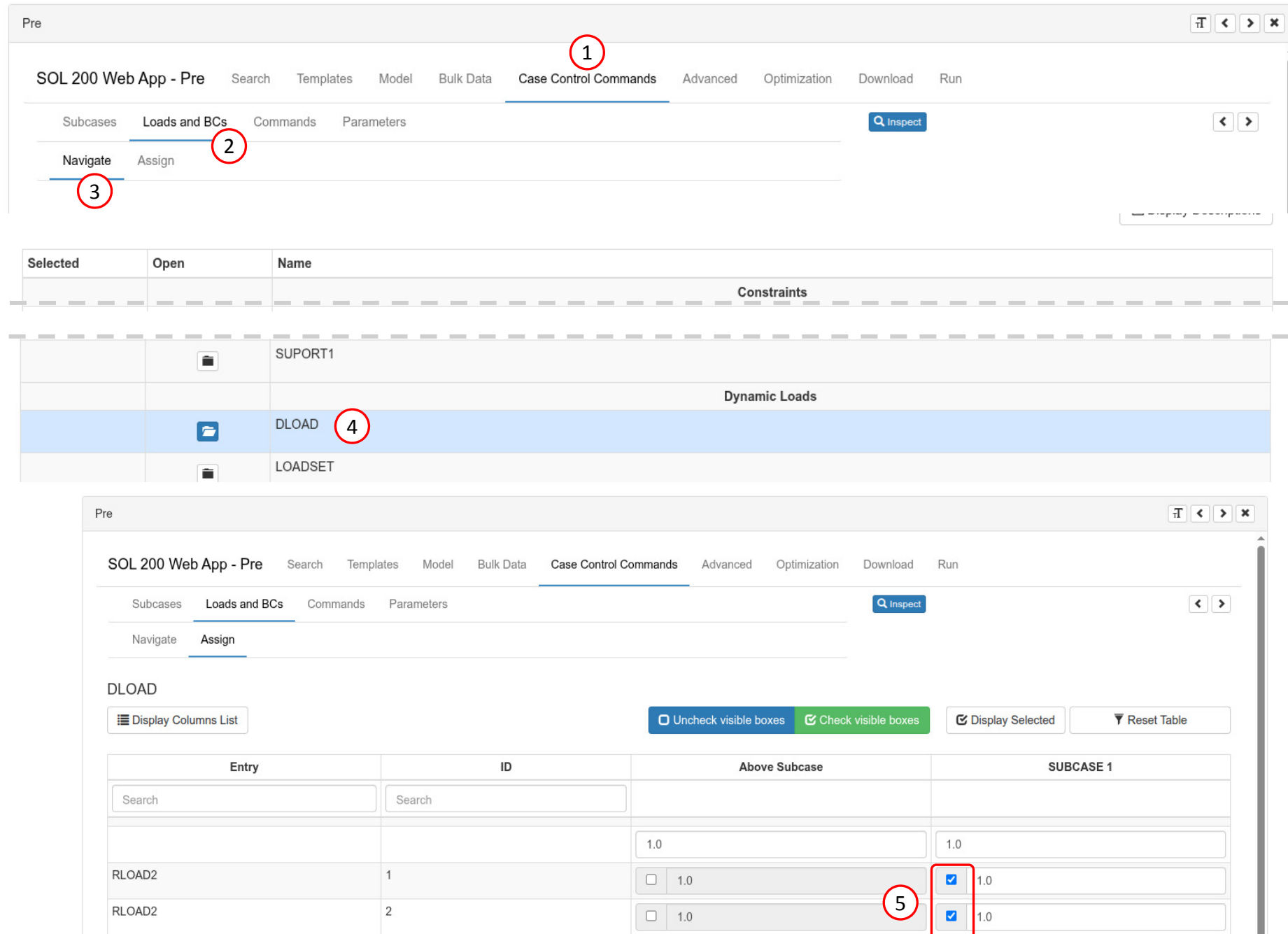
RLOAD2 - Frequency Response Dynamic Excitation, Form 2

1. Horizontally scroll until the Plot column is visible
2. The column Plot displays the temporal distribution of the load based on the values configured in the RLOAD2 and TABLED1 entries.



DLOAD - Dynamic Load Set Selection

1. Click Case Control Commands
2. Click Loads and BCs
3. Click Navigate
4. Select DLOAD
5. Assign RLOAD2 ID=1 and ID=2 to SUBCASE 1.



SPC - Single Point Constraint Set Selection

- 1. Click Navigate
- 2. Select SPC
- 3. For SPC1 ID=101 select the checkbox in column Above Subcase

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Assign

1

Display Descriptions

Selected	Open	Name
		Constraints
		AUTOSPC
		AXISYMMETRIC
		BC
		DSYM
		MPC
		SPC
		STATSUB

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SPC

Display Columns List

Uncheck visible boxes

Check visible boxes

Display Selected

Reset Table

Entry	ID	Above Subcase	SUBCASE 1
SPC1	1	3	

SET - Set Definition, General Form

1. Click Commands
2. Click Configure
3. Click the Pick button

Pre

SOL 200 Web App - Pre Search Templates Model Bulk Data Case Control Commands Advanced Optimization Download Run

Subcases Loads and BCs Commands Parameters

Select Configure

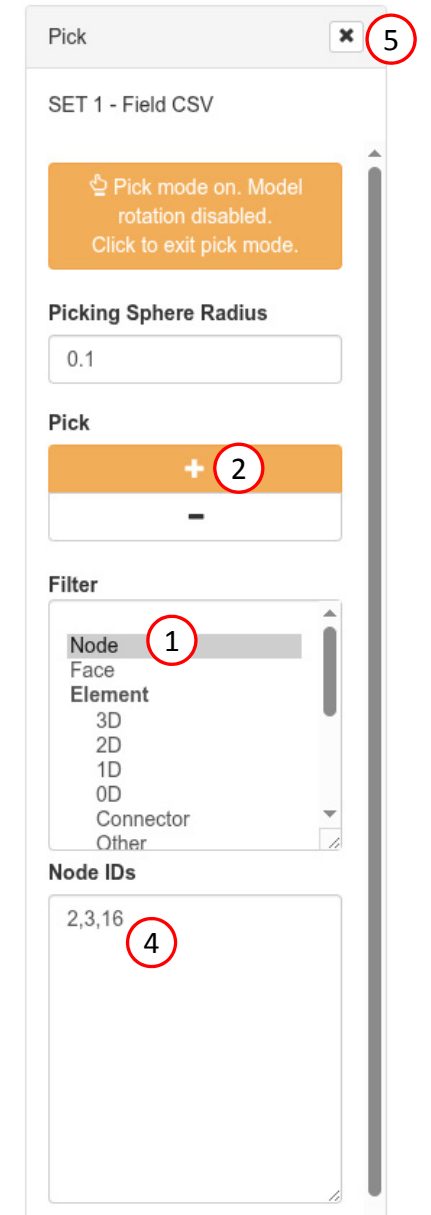
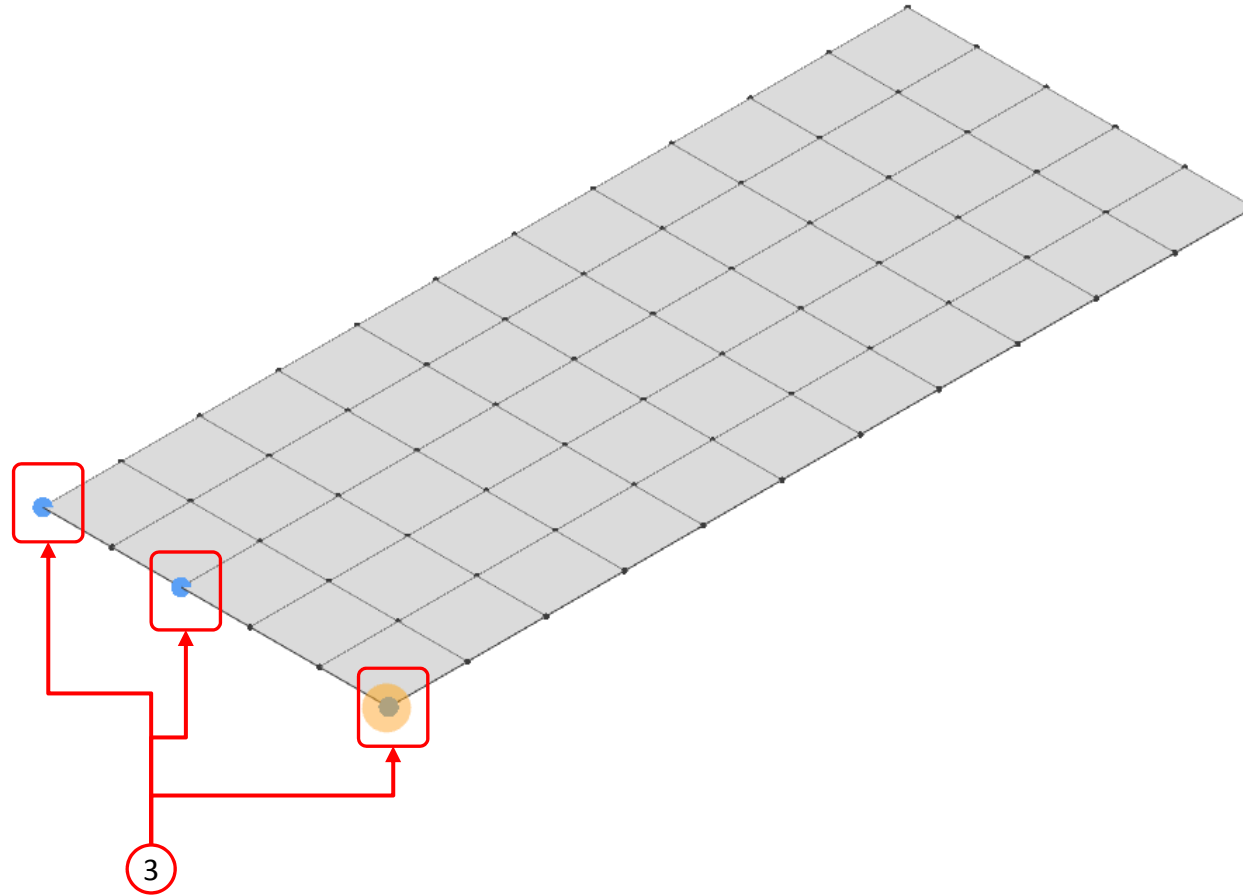
Display Columns List

Reduce Size of F06 Display Description Reset Table

Command	Above Subcase	SUBCASE 1
DISPLACEMENT	Search Describers SORT1 SORT2 PRINT PUNCH PLOT ODS REAL IMAG PHASE PSDF ATOC Option Right of Equal Sign SET - 1 Field CSV {PH} Describers SORT EXCEPT	
ECHO		

SET - Set Definition, General Form

1. Set Filter to Node
2. Click +
3. Move the mouse cursor to the indicated region. Click and hold the left mouse button, then drag the picking sphere to select
4. The selected node IDs are stored
5. Click X



SET - Set Definition, General Form

1. The selected node IDs are now stored

- A. SORT1 and SORT2 control how the output is printed to the F06 file. SORT2 is the preferred choice when performing frequency or transient analysis.
 - SORT1: For each excitation frequency, print the results for each node.
 - SORT2: For each node, print the results for each excitation frequency.
- B. The default option REAL will print real and imaginary terms. The PHASE option will print magnitude and phase terms.

Pre

SOL 200 Web App - Pre Search Templates Model Bulk Data Case Control Commands Advanced Optimization Download Run

Subcases Loads and BCs Commands Parameters

Select Configure

Display Columns List

Reduce Size of F06 Display Description Reset Table

Command	Above Subcase	SUBCASE 1
DISPLACEMENT	Search Describers SORT1 SORT2 A PRINT PUNCH PLOT ODS REAL IMAG PHASE B PSDF ATOC Option Right of Equal Sign SET - 1 Field CSV 2,3,16 1	
ECHO	Describers SORT EXCEPT cdni UNSORT BOTH NONE PUNCH FILE	

Excitation Frequencies

1. Click Entries
2. Click Close All
3. Click FREQ1
4. Click FREQ4

Pre

SOL 200 Web App - Pre Search Templates Model Bulk Data **Case Control Commands** Advanced Optimization Download Run

Subcases Loads and BCs Commands Parameters **Entries** Assign Entries

Open Active Close All

FREQUENCY **METHOD**

FREQ EIGR
FREQ1 EIGRL
FREQ2 EIGB
FREQ3
FREQ4
FREQ5

Configure FREQ1

Batch All Download CSV Upload CSV

Delete	SID	F1	DF	NDF
	Search	Search	Search	Search
	Set identification number. (Integer > 0)	First frequency in set. (Real > 0.0)	Frequency increment. (Real > 0.0)	Number of frequency increments. (Integer > 0; Default = 1)

Excitation Frequencies

1. The table of FREQ1 entries is now visible
2. The table of FREQ4 entries is also visible
3. Use the indicated scroll bar to view both tables

Configure FREQ1 1

Batch All

Download CSV

Upload CSV

Reset Table

Create Entry

Delete	SID	F1	DF	NDF	Plot
	Search	Search	Search	Search	
	Set identification number. (Integer > 0)	First frequency in set. (Real > 0.0)	Frequency increment. (Real > 0.0)	Number of frequency increments. (Integer > 0; Default = 1)	
	Integer ↓	Real ↓	Real ↓	Integer ↓	
✕	1	0.	10.	100	Plot Entries with Same ID

Configure FREQ4 2

Batch All

Download CSV

Upload CSV

Reset Table

Create Entry

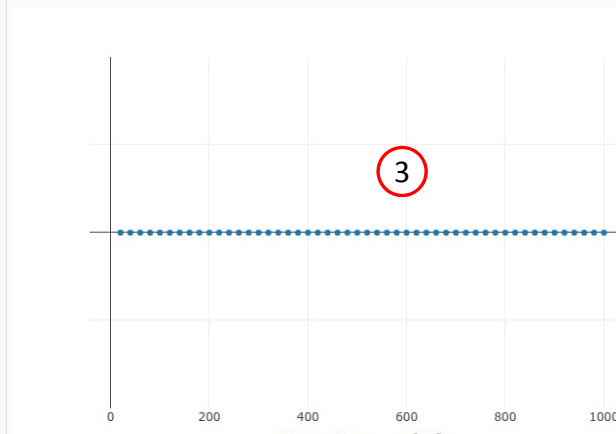
Delete	SID	F1	F2	FSPD	NFM	Plot
	Search	Search	Search	Search	Search	
	Set identification number. (Integer > 0)	Lower bound of frequency range in cycles per unit time....	Upper bound of frequency range in cycles per unit time....	Frequency spread, +/- the fractional amount specified for...	Number of evenly spaced frequencies per "spread" mode....	
	Integer ↓	Real ↓	Real ↓	Real ↓	Integer ↓	

FREQ1 - Frequency List, Alternate Form 1

1. Scroll to the table of FREQ1 entries
2. Supply the following values
 - F1: 20.
 - DF: 20.
 - NDF: 49
3. A plot displays the excitation frequencies

This defines excitation frequencies and are sometimes referred to as the solution frequencies or forcing frequencies.

Configure FREQ1 **1**

Delete	SID	F1	DF	NDF	Plot
	Search	Search	Search	Search	
	Set identification number. (Integer > 0)	First frequency in set. (Real > 0.0)	Frequency increment. (Real > 0.0)	Number of frequency increments. (Integer > 0; Default = 1)	
	Integer ↓	Real ↓	Real ↓	Integer ↓	
✖	1	20.	20.	49	Plot Entries with Same ID 
			2		

FREQ4 - Frequency List, Alternate Form 4

1. Select row FREQ4

2. Click Create Entry

3. Supply the following values

- F1: 20.
- F2: 1000.
- FSPD: .03
- NFM: 5

4. Supply the following values

- List of dummy natural frequencies:

133.6672, 689.0816, 842.0373

These are the natural frequencies from the normal modes analysis. Alternatively you can leave the box empty and dummy test frequencies will be determined automatically.

- These dummy or test frequencies are referred to as f1, f2, and f3, respectively.

5. The column Plot displays the corresponding excitation frequencies.

Configure FREQ4 1

Batch All 2 Reset Table Create Entry

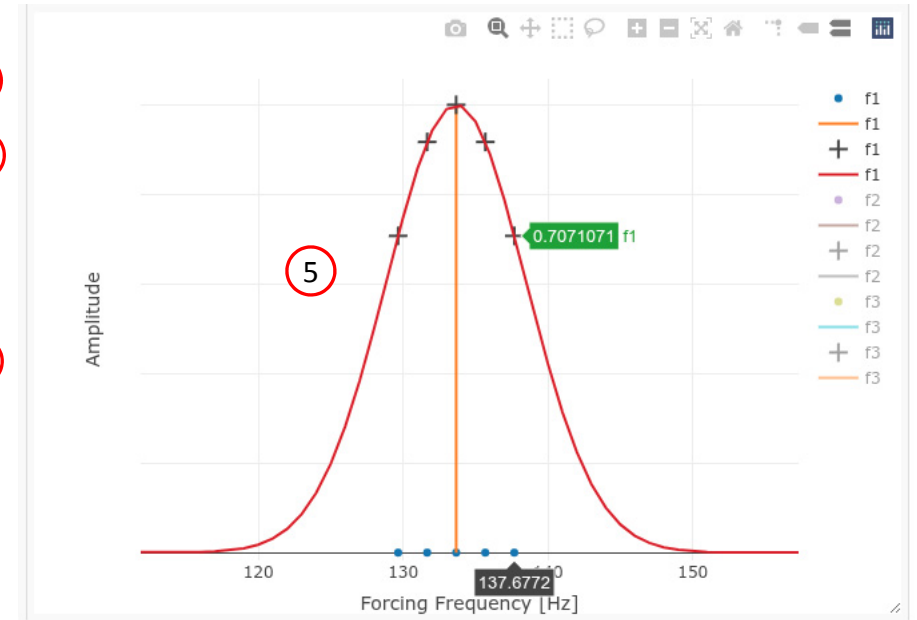
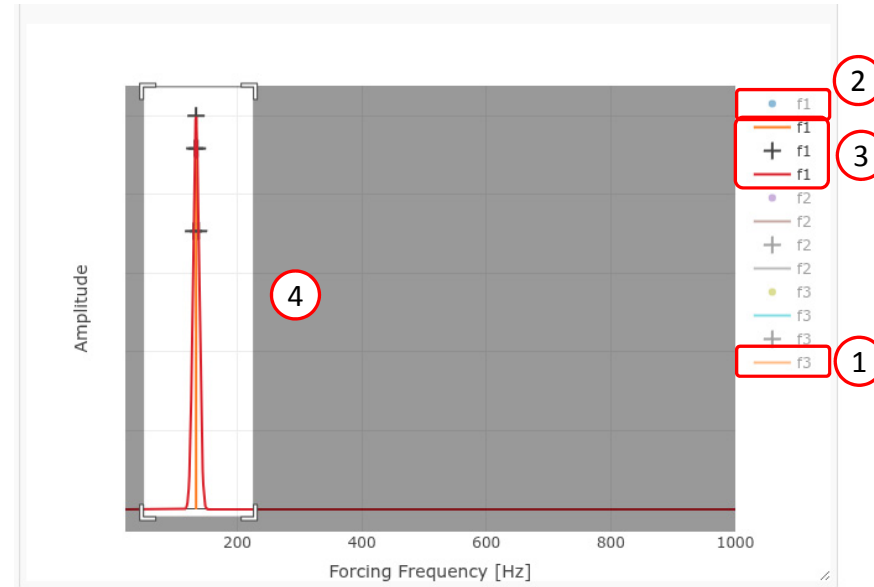
Download CSV Upload CSV

Delete	SID	F1	F2	FSPD	NFM	
	Search	Search	Search	Search	Search	
	Set identification number. (Integer > 0)	Lower bound of frequency range in cycles per unit time....	Upper bound of frequency range in cycles per unit time....	Frequency spread, +/- the fractional amount specified fo...	Number of evenly spaced frequencies per "spread" mode....	
	Integer ↓	Real ↓	Real ↓	Real ↓	Integer ↓	
✖	2	20.	1000.	.03	5	List of dummy natural frequencies (f1, f2, f3) 133.6672, 689.0816, 842.0373 Plot Entries with Same ID

3 4 5

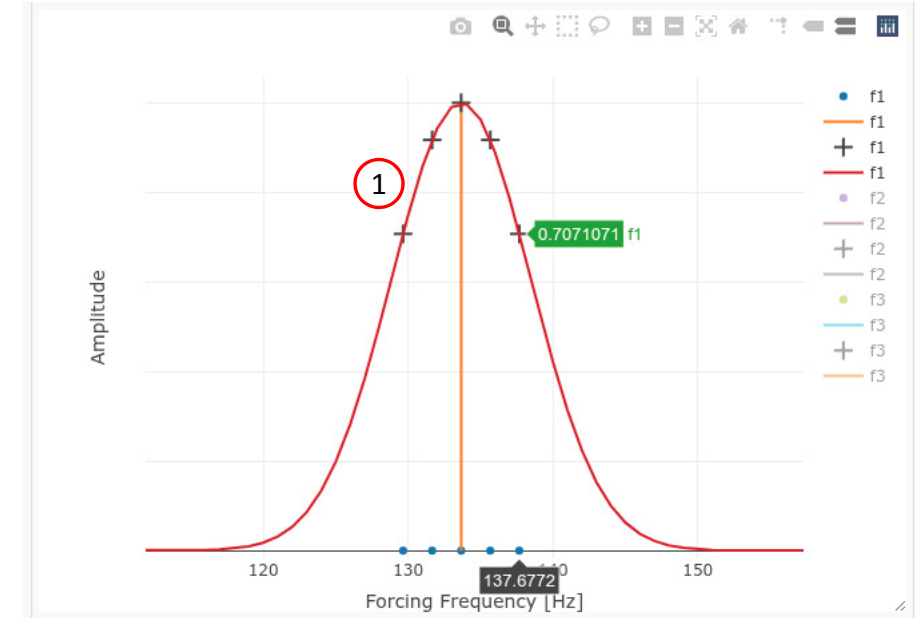
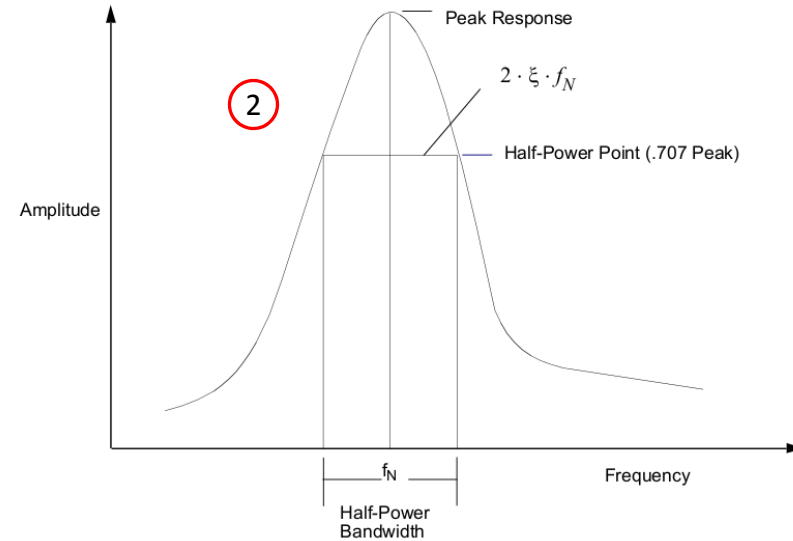
FREQ4 - Frequency List, Alternate Form 4

1. Double click the indicated row
 - This will toggle the visibility so only one row is visible. Double clicking again will display all rows.
2. Double click the indicated row
3. Individually click the indicated rows
4. Click, drag and select the indicated region
5. The plot is now updated
 - The excitation frequencies for natural frequency f1 are displayed.



FREQ4 - Frequency List, Alternate Form 4

1. Five evenly spaced excitation frequencies between the half power points of resonant frequency f_1 are shown
2. This plot in the web app aligns with the plot shown in the Quick Reference Guide, entry FREQ4

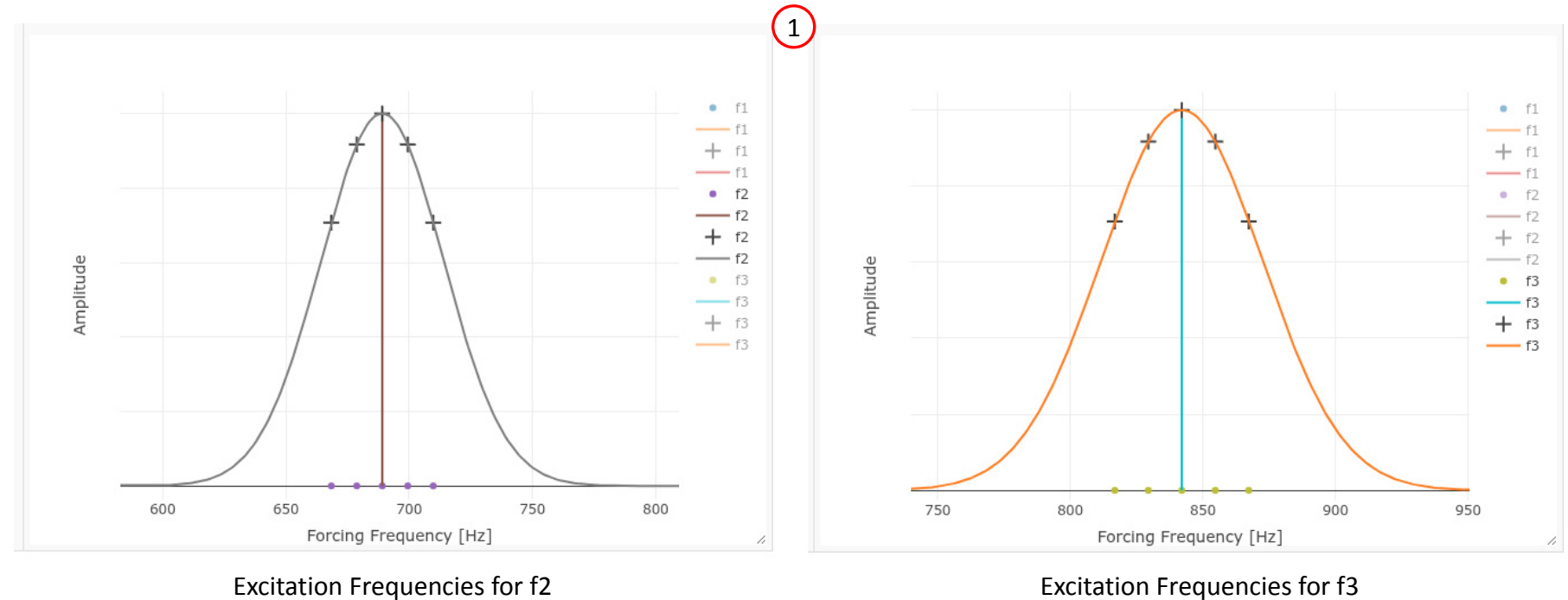
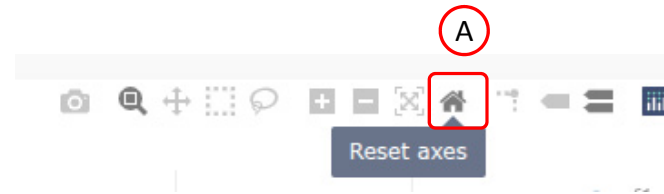


Excitation Frequencies for f_1

FREQ4 - Frequency List, Alternate Form 4

1. Repeat the previous steps for frequency f2 and f3.

A. If needed, click the Reset Axes button to restore the plot to a default state.



FREQ4 - Frequency List, Alternate Form 4

1. Update the following value
 - SID: 1
2. Click Plot Entries with Same ID
3. All the excitation frequencies for any entry $FREQ$, $FREQ_1$, ..., $FREQ_5$ with the same ID are now displayed in a single plot. The frequencies from $FREQ_1$ ID=1 and $FREQ_4$ ID=1 are now plotted.

Configure FREQ4

Delete	SID	F1	F2	FSPD	NFM	
	Search	Search	Search	Search	Search	
	Set identification number. (Integer > 0)	Lower bound of frequency range in cycles per unit time....	Upper bound of frequency range in cycles per unit time....	Frequency spread, +/- the fractional amount specified fo...	Number of evenly spaced frequencies per "spread" mode....	
	Integer ↓	Real ↓	Real ↓	Real ↓	Integer ↓	
✖	1 1	20.	1000.	.03	5	List of dummy natural frequencies (f_n) 133.6672, 689.0816, 842.0373 ✖ Plot Entries with Same ID 2

Amplitude

Forcing Frequency [Hz]

Legend:

- FREQ1_1.1_f1
- FREQ4_1.2_f1
- FREQ4_1.2_f1
- FREQ4_1.2_f1
- FREQ4_1.2_f1
- FREQ4_1.2_f2
- FREQ4_1.2_f2
- FREQ4_1.2_f2
- FREQ4_1.2_f2
- FREQ4_1.2_f3
- FREQ4_1.2_f3
- FREQ4_1.2_f3
- FREQ4_1.2_f3

3

SDAMPING - Structural Damping

- 1. Click Commands
- 2. Click Select
- 3. Search the table for SDA or SDAMPING
- 4. For row SDAMPING, mark the indicated checkbox

Structural damping (SDAMPING) is now on for the above subcase level.

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Select

Configure

1

Display Columns List

Display Description

Display Selected

Reset Table

Command	Above Subcase	SUBCASE 1
sda		
RSDAMP	☐	☐
SDAMPING	☒	☐

10

20

30

40

50

Excitation Frequencies

1. Click Entries
2. Click Close All
3. Click TABDMP1
4. The table of TABDMP1 entries is now visible

Pre

SOL 200 Web App - Pre Search Templates Model Bulk Data **Case Control Commands** Advanced Optimization Download Run

Commands Parameters **Entries** Assign Entries [Inspect](#)

1

[Open Active](#) [Close All](#) **2**

FREQUENCY **METHOD** **SDAMPING**

FREQ EIGR **TABDMP1** **3**

FREQ1 EIGRL TABLED1

FREQ2 EIGB TABLED2

FREQ3 TABLED3

FREQ4 TABLED4

FREQ5 TABLED5

Configure TABDMP1 **4**

[Batch All](#)

[Download CSV](#) [Upload CSV](#)

Delete	TID	TYPE	GROUP_1
	Search	Search	
	Table identification number. (Integer > 0)	Type of damping units. (Character: "G", "CRIT", or "Q"; Default is "G")	
	Integer ↓	↓	

TABDMP1 - Modal Damping Table

- 1. Click Create Entry
- 2. Supply the following values
 - TYPE: CRIT
- 3. Click Add Row 2 times
- 4. For row 1, supply the following values:
 - fi: 0.
 - gi: .03
- 5. For row 2, supply the following values:
 - fi: 10.
 - gi: .03

Configure TABDMP1

Batch All

Download CSV

Upload CSV

Reset Table

Create Entry

Delete	TID	TYPE	GROUP_1				
	Search	Search					
	Table identification number. (Integer > 0)	Type of damping units. (Character: "G", "CRIT", or "...)					
	Integer ↓	↓					
✖	2	CRIT	+ Add Row			Download CSV File	Upload CSV File
			+	✖	Number	fi	gi
						Search	Search
						Natural frequency value in cycles per unit time. (Real >...	Damping value. (Real)
						↔ Real ↓	↔ Real ↓
			+	✖	1	0.	.03
			+	✖	2	10.	.03
			10 20 50 100 200				

TABDMP1 - Modal Damping Table

1. Use the indicated scroll bar to display the column Plot.
2. The Plot column displays the interpolation function based on the supplied points (f_i , g_i) (Not shown)

Configure TABDMP1

↓ Batch All

 Download CSV Upload CSV

Reset Table

[+ Create Entry](#)

GROUP_1

[Download CSV File](#)
[Upload CSV File](#)

Delete	Number	fi	gi
		Search	Search
		Natural frequency value in cycles per unit time. (Real >...	Damping value. (Real)
		☐ Real ↓	☐ Real ↓
✖	1	☐ 0.	☐ .03
✖	2	☐ 10.	☐ .03

Plot

TABDMP1 - Modal Damping Table

- 1. Click Assign Entries
- 2. Find the row corresponding to TABDMP1 ID=2
- 3. Mark the corresponding checkbox

The TABDMP1 entry has been assigned to command SDAMPING and the above subcase level. Structural damping is now based on the interpolation function defined in the TABDMP1 entry.

When assigned to the above subcase level, that assignment also applies to subsequent subcases, e.g. subcase 1, subcase 2, etc.

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Command	Entry Name	Entry ID	Above Subcase	SUBCASE 1
Search	Search	Search		
FREQUENCY				
	FREQ1	1	☒	☐
	FREQ4	1	☒	☐
METHOD				
	EIGRL	1	☒	☐
SDAMPING				
	TABDMP1	2	☒	☐
	TABLED1	1	☐	☐

10

20

30

40

Download

1. Navigate to Pre > Download
2. Click Download BDF

The Nastran model is now downloaded and saved to your desktop.

The screenshot shows the 'Pre' software interface. The top menu bar includes 'Pre', 'SOL 200 Web App - Pre', 'Search', 'Templates', 'Model', 'Bulk Data', 'Case Control Commands', 'Advanced', 'Optimization', 'Download' (circled with a red '1'), and 'Run'. Below the menu bar is a search bar with the text 'Inspect' and navigation arrows. The main content area is divided into two sections: 'Notifications' on the left and 'Download' on the right. The 'Notifications' section contains a yellow warning box with the text 'Warning! Inspect the following messages before continuing.' and a table with two columns: 'Notification' and 'Description'. The table has one row with the notification 'Unassigned load, BC or other.' and the description 'The following entries are not assigned and are possibly not used during the analysis: FORCE 1 , PLOAD2 2'. The 'Download' section contains three buttons: 'Download BDF Template' (light blue), 'Download BDF' (orange, circled with a red '2'), 'Upload BDF and Configure Run' (dark blue), and 'Upload BDF and Immediately Run' (green).

Pre

SOL 200 Web App - Pre Search Templates Model Bulk Data Case Control Commands Advanced Optimization **Download** Run

Inspect

Notifications

Warning! Inspect the following messages before continuing.

Notification	Description
Unassigned load, BC or other.	The following entries are not assigned and are possibly not used during the analysis: FORCE 1 , PLOAD2 2

Download

Download BDF Template

Download BDF

Upload BDF and Configure Run

Upload BDF and Immediately Run

Run

1. Click Upload BDF and Immediately Run

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Inspect

Notifications

Warning! Inspect the following messages before continuing.

Notification	Description
Unassigned load, BC or other.	The following entries are not assigned and are possibly not used during the analysis: FORCE 1 , PLOAD2 2

Download

Download BDF Template

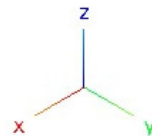
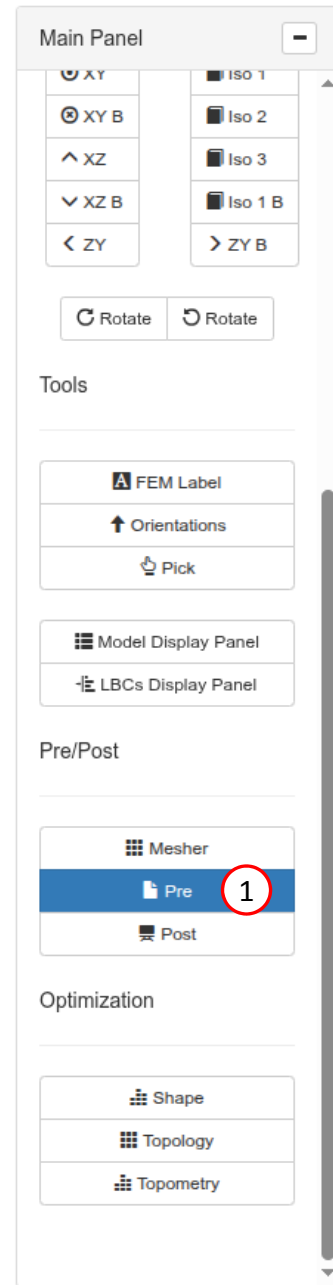
Download BDF

Upload BDF and Configure Run

Upload BDF and Immediately Run1

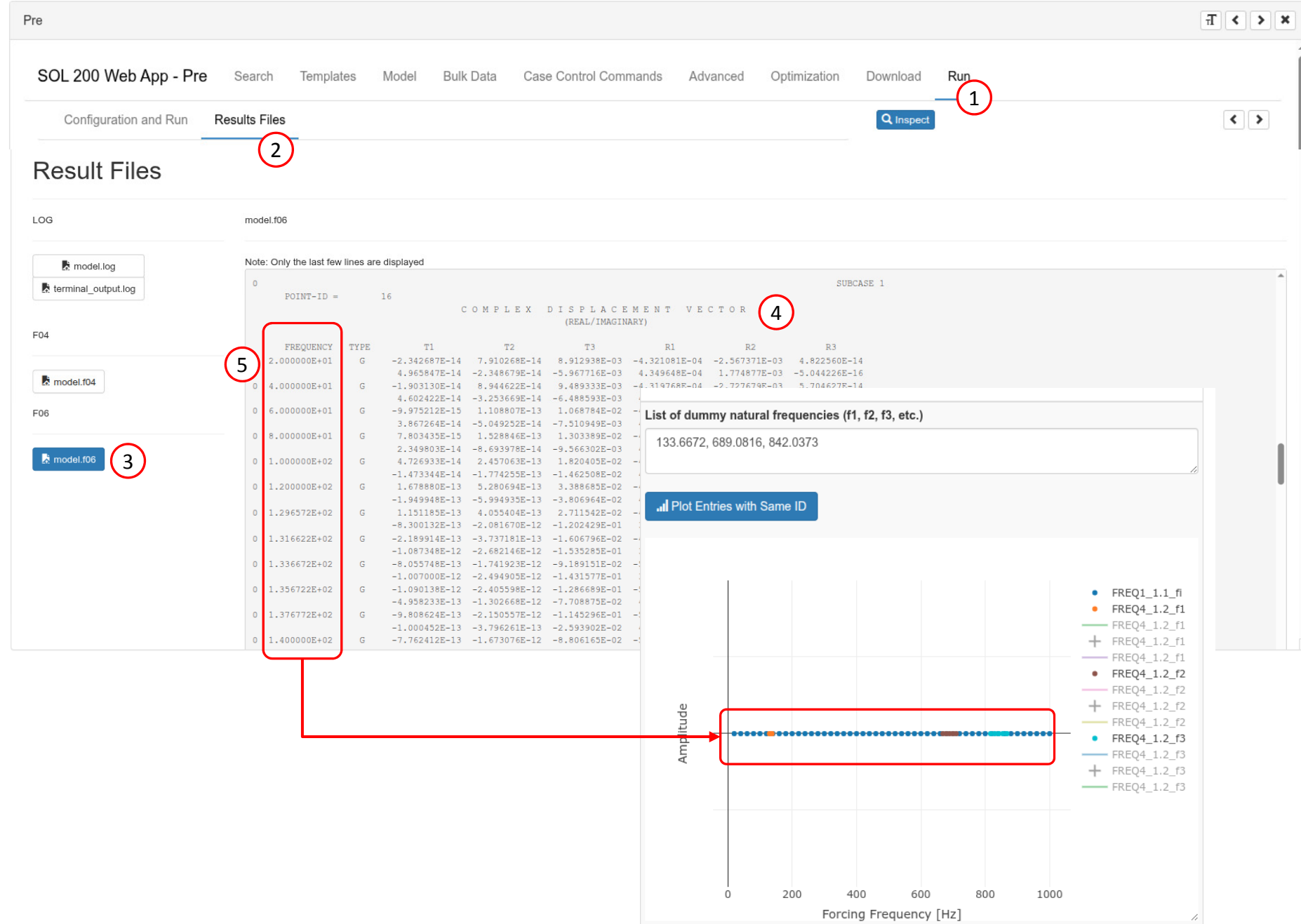
Pre

1. Click Pre



F06 - Excitation Frequencies

1. Click Run
2. Click Result Files
3. In the left hand side, click model.f06 to display the contents of the file.
4. Vertically scroll until table COMPLEX DISPLACEMENT VECTOR is displayed.
5. The excitation frequencies in the vertical column are identical to the points shown in the plot for FREQ1 and FREQ4.



F06 - Displacements

1. Recall that displacements are output for the following grid IDs: 2, 3, 16
2. The f06 file lists the displacements at these grid IDs

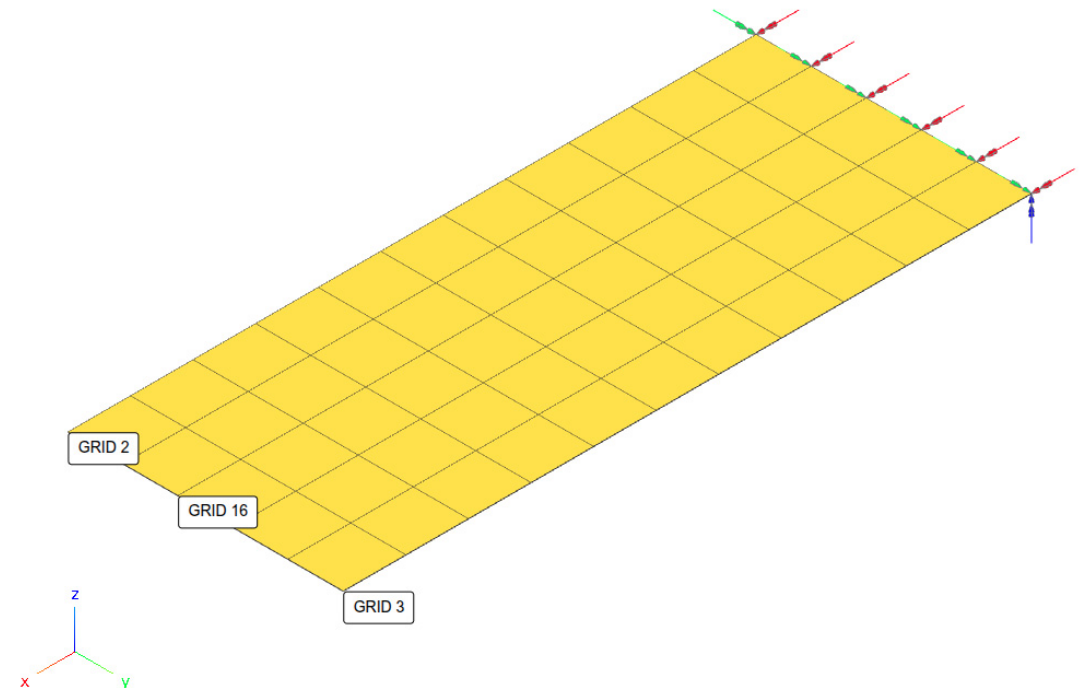
BDF Output

```
$ 1 || 2 || 3 || 4 ||
SET 1 = 2,3,16 ①
ECHO=NONE
$ Dynamic Solution Conditions
FREQUENCY=1
METHOD=1
SDAMPING=2
$ Physical Set Output Requests
DISPLACEMENT (SORT2, PHASE)=1
$ Loads and BCs
SPC=1
SUBCASE 1
  $ Loads and BCs
  DLOAD=9001
```

model.f06

Note: Only the last few lines are displayed

SUBCASE 1									
0	POINT-ID =	16 ②	COMPLEX DISPLACEMENT VECTOR (MAGNITUDE/PHASE)						
FREQUENCY	TYPE	T1	T2	T3	R1	R2	R3		
0 2.000000E+01	G	5.490703E-14 115.2561	8.251583E-14 343.4630	1.072633E-02 326.1955	6.131165E-04 134.8112	3.121151E-03 145.3431	4.822823E-14 359.4007		
0 4.000000E+01	G	4.980381E-14 112.4654	9.518016E-14 340.0108	1.149562E-02 325.6366	6.138920E-04 134.7221	3.335661E-03 144.8585	5.762573E-14 351.8679		
0 6.000000E+01	G	3.993843E-14 104.4636	1.218360E-13 335.5166	1.306309E-02 324.9021	6.150125E-04 134.6265	3.772427E-03 144.2372	7.885150E-14 342.7582		
0 8.000000E+01	G	2.475987E-14 71.6292	1.758756E-13 330.3747	1.616775E-02 323.7230	6.160002E-04 134.5235	4.637226E-03 143.2137	1.236888E-13 333.9327		
0 1.000000E+02	G	4.951226E-14 342.6882	3.030699E-13 324.1668	2.335124E-02 321.2217	6.151607E-04 134.4235	6.637636E-03 140.9160	2.312709E-13 325.3615		
0 1.200000E+02	G	2.573117E-13	7.989054E-13	5.096682E-02	6.015903E-04	1.432464E-02	6.541004E-13		



Displacement vs. Frequency Graphs/Plots

Graphs are desired that show Displacement vs. Frequency.

- 1. Scroll to the section titled Files on Remote System
- 2. For the row listing file model.h5, click View Results - HDF5 Explorer

Pre

SOL 200 Web App - PreSearchTemplatesModelBulk DataCase Control CommandsAdvancedOptimizationDownloadRun

Configuration and RunResults FilesInspect

Result Files

LOGmodel.log

model.logterminal_output.log

F04model.f04

F06

MSC Nastran V2025.2 (Intel Linux 5.15.0-139-generic) Control File:

Nastran BUFFSIZE=65537 \$ (/msc/MSC_Nastran/2025.2/conf/nast20252rc[4])
\$ \$ (/msc/MSC_Nastran/2025.2/conf/nast20252rc[6])
\$ \$ (/msc/MSC_Nastran/2025.2/conf/nast20252rc[11])
\$ End \$ (/msc/MSC_Nastran/2025.2/conf/nast20252rc[13])
Nastran NLINES=99999999 \$ (/msc/MSC_Nastran/2025.2/conf/nast20252rc[15])
Nastran MAXLINES=9999999 \$ (/msc/MSC_Nastran/2025.2/conf/nast20252rc[16])
JID='./model.bdf'
OUT='./model'
PWDDIR=/scratch/remote_jobs/20260514_120248
MEM=7787MB \$
PMEM=0+
MACH='Intel'

Files on Remote System1

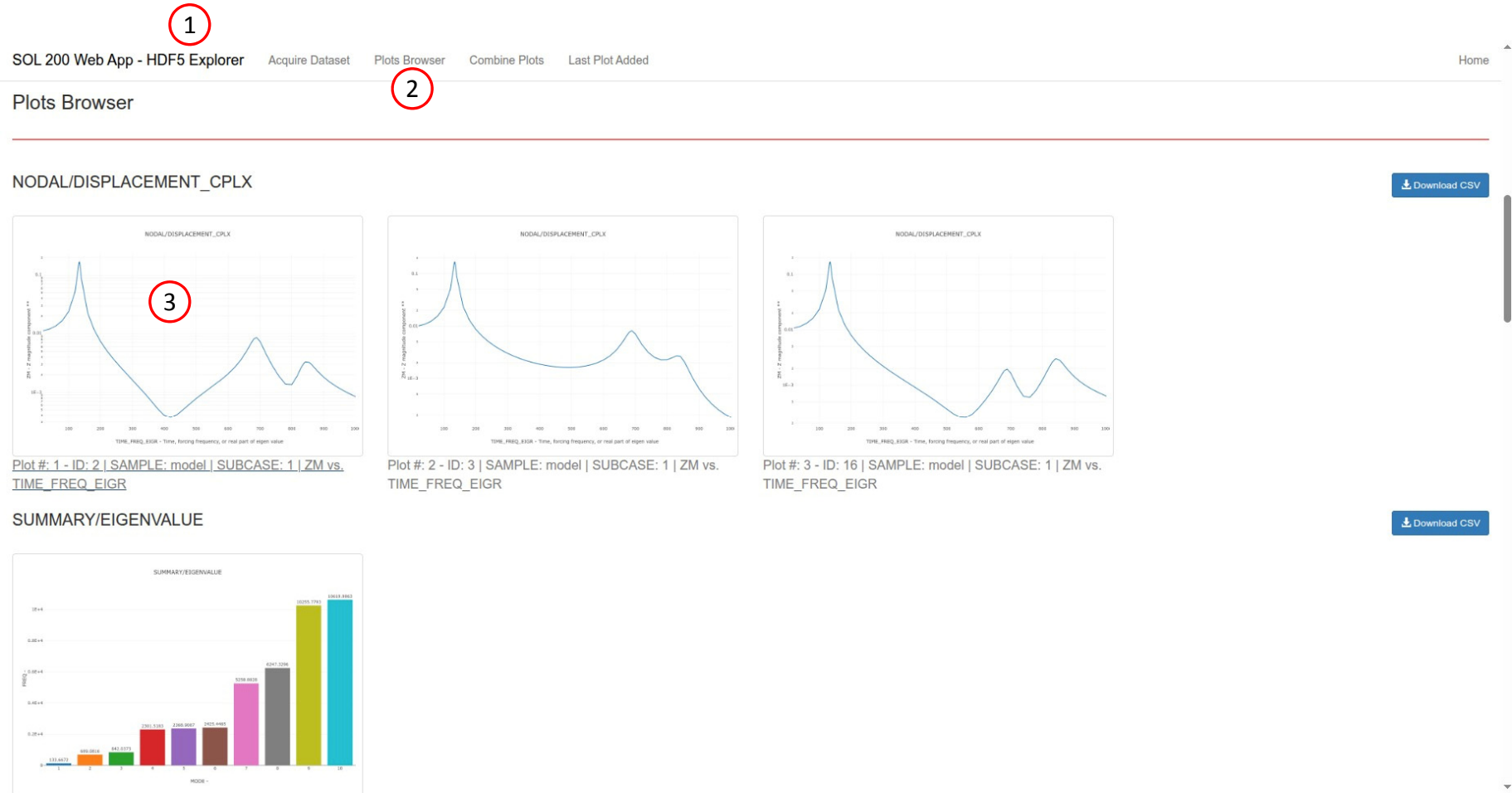
Reset TableToggle CheckboxesDownload Selected FilesUpdate List of FilesLast Update: Thu May 14 2026 17:00:45 GMT-0700 (Pacific Daylight Time)

	File Name	File Size	File Extension	Download Link	Results Link
	Search		Search		
☐	model.bdf	8.0 kB	.bdf	Download	
☐	model.f04	0.2 MB	.f04	Download	
☐	model.f06	0.1 MB	.f06	Download	
☐	model.h5	35.7 kB	.h5	Download	View Results - HDF5 Explorer2 View Results - Post
☐	model.log	9.4 kB	.log	Download	
☐	terminal_output.log	0.6 kB	.log	Download	

102550100

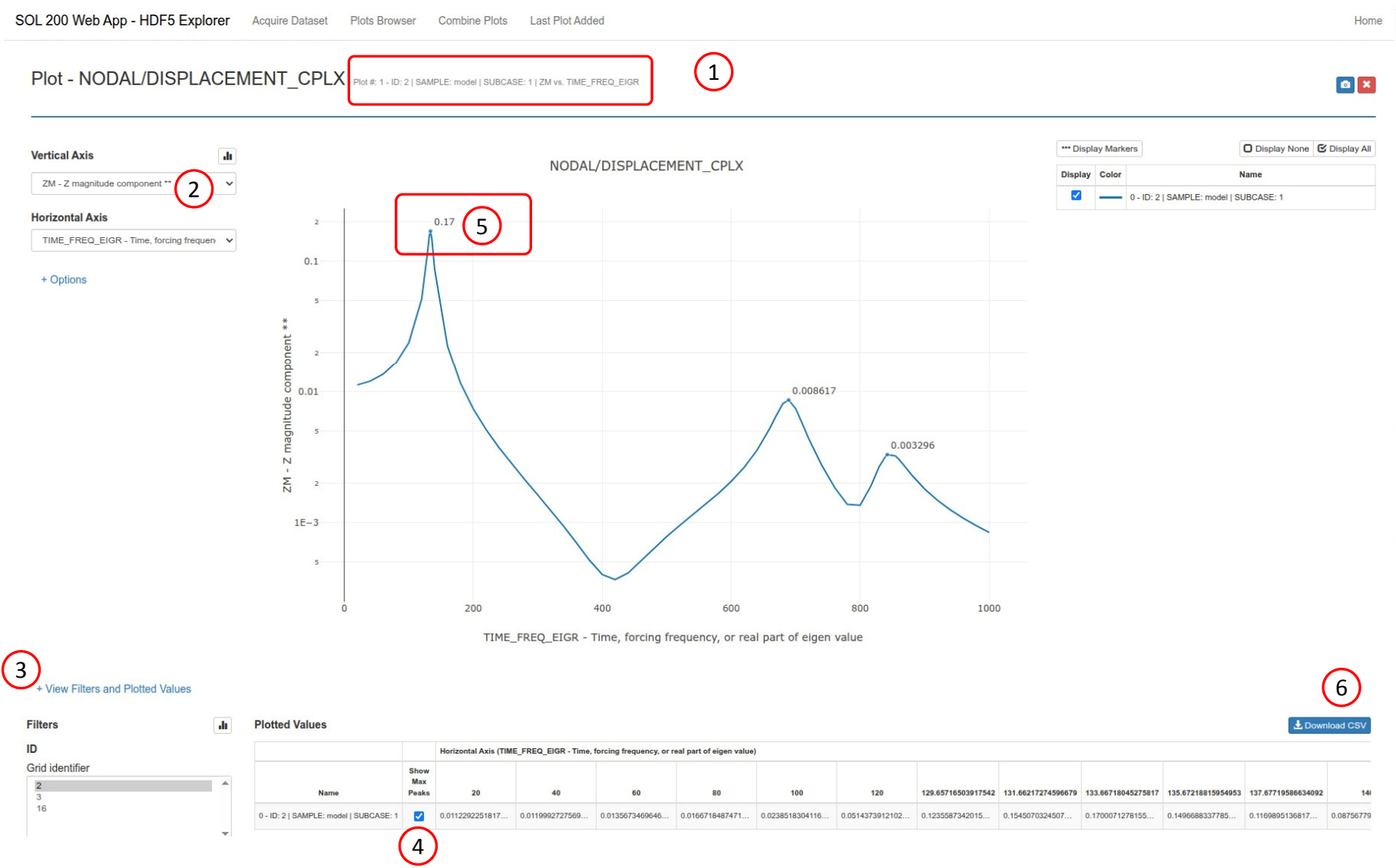
Displacement vs. Frequency Graphs/Plots

1. The HDF5 Explorer is opened. Wait until loading is complete.
2. Click Plots Browser
3. Click the indicated plot
 - This graph displays displacement vs. frequency for GRID ID 2.



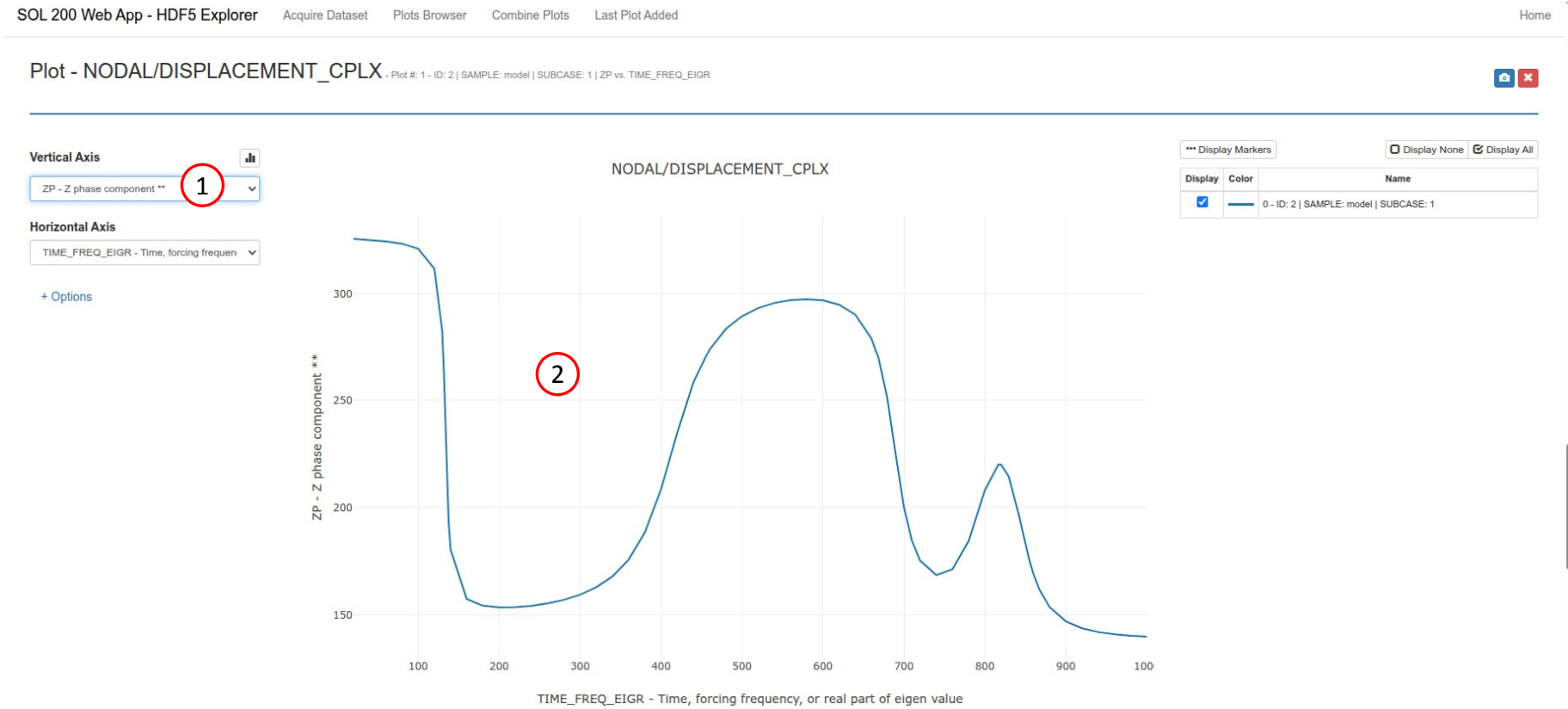
Displacement vs. Frequency Graphs/Plots

1. The plot for displacement vs. frequency is displayed at grid 2
2. Currently, the ZM component is displayed
3. Click View Filters and Plotted Values
4. Mark the indicated checkbox
5. Maximum labels are now visible on the graph
6. Click Download CSV
 - A CSV file is downloaded and contains the values used to create the plot



Displacement vs. Frequency Graphs/Plots

1. Set Vertical Axis to ZP - Z phase component
2. The graph is updated to show the ZP component

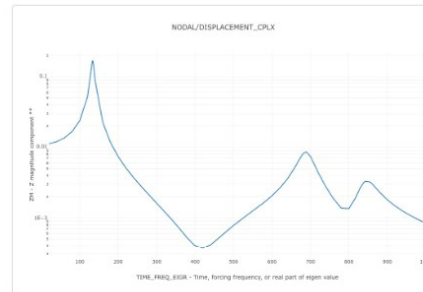


Displacement vs. Frequency Graphs/Plots

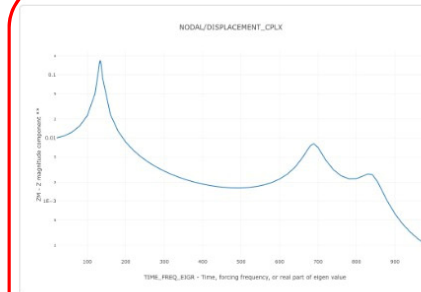
1. Repeat the previous steps for node 3 and 16.

Plots Browser

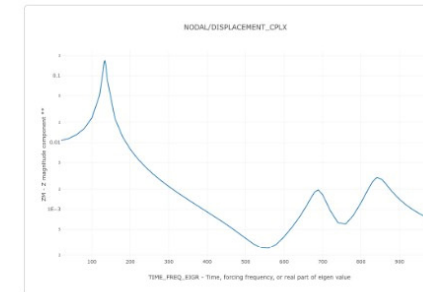
NODAL/DISPLACEMENT_CPLX



Plot #: 1 - ID: 2 | SAMPLE: model | SUBCASE: 1 | ZM vs. TIME_FREQ_EIGR



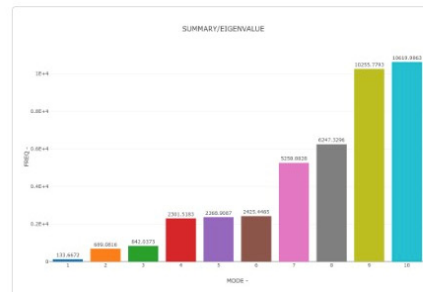
Plot #: 2 - ID: 3 | SAMPLE: model | SUBCASE: 1 | ZM vs. TIME_FREQ_EIGR



Plot #: 3 - ID: 16 | SAMPLE: model | SUBCASE: 1 | ZM vs. TIME_FREQ_EIGR

Download CSV

SUMMARY/EIGENVALUE



1

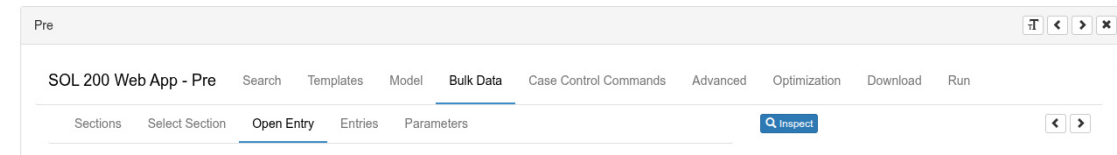
Download CSV

Final Comments - MODEL SUMMARY

These steps are optional.

- A. The F06 file contains a MODEL SUMMARY table and lists bulk data entries Nastran has read from the BDF file.
- B. The web app has a similar table. Navigate to Pre > Bulk Data > Open Entry.
- C. Click Display Active.
- D. A listing is displayed of bulk data entries that have been defined

M O D E L	S U M M A R Y
ENTRY NAME	NUMBER OF ENTRIES
-----	-----
CQUAD4	55
DLOAD	1
EIGRL	1
FORCE	1
FREQ1	1
FREQ4	1
GRID	72
HDF5OUT	1
MAT1	1
PARAM	2
PLOAD2	1
PSHELL	1
RLOAD2	2
SPC1	1
TABDMP1	1
TABED1	1



Open Entry **B**

C

Display Title Display Description **Display Active** Reset Table

Open	Entry Name	Active	Number of Entries
	Search		
	SET	▲	1
	CQUAD4	▲	55
	DLOAD	▲	1
	EIGRL	▲	1
	FORCE	▲	1
	FREQ1	▲	1
	FREQ4	▲	1
	GRID	▲	72
	HDF5OUT	▲	1
	MAT1	▲	1
	PLOAD2	▲	1
	PSHELL	▲	1
	RLOAD2	▲	2
	SPC1	▲	1
	TABDMP1	▲	1
	TABED1	▲	1

D

End of Tutorial