

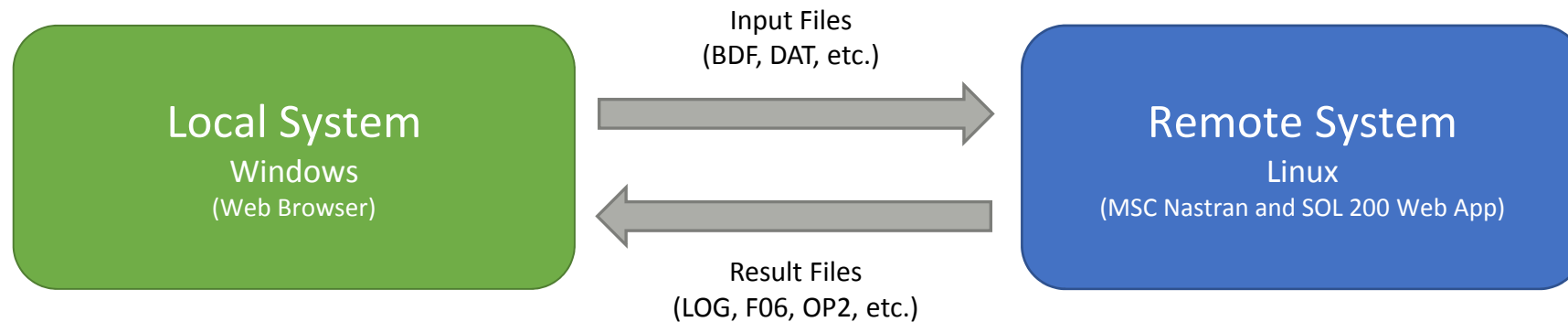
Workshop - Remote execution of MSC Nastran on a remote operating system available on the local network

A SOL 200 WEB APP TUTORIAL

Goal: Perform an MSC Nastran analysis on a remote Linux system on the local network

Run MSC Nastran on a remote operating system and:

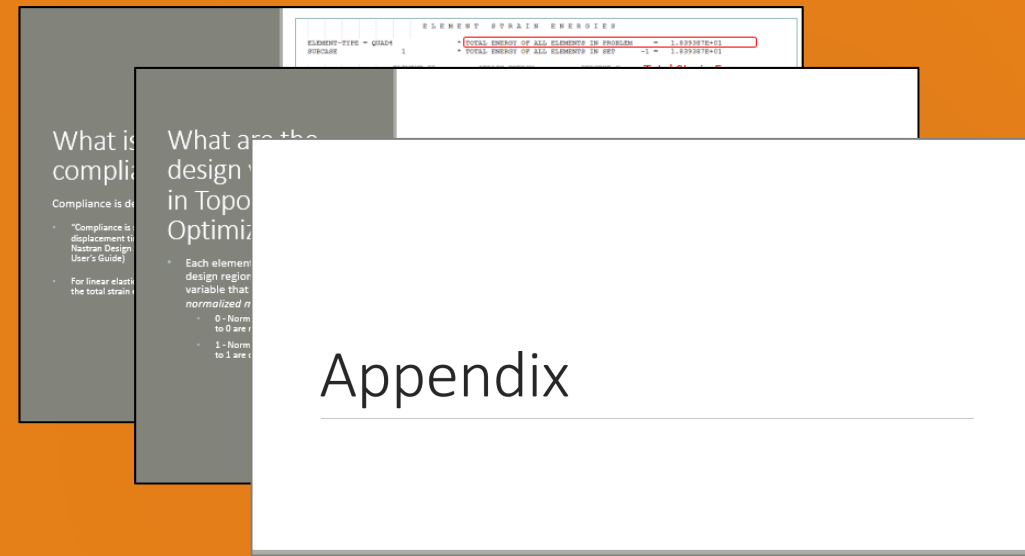
1. Upload a BDF or DAT file to a remote operating system
2. Execute MSC Nastran on the remote operating system
3. Inspect the LOG, F06 and F04 during the MSC Nastran run
4. Download the result files from the remote system



More Information Available in the Appendix

The Appendix includes information regarding the following:

- Options for Remote Execution
- Notable Behaviors of the SOL 200 Web App
- Remote Execution Manager
- INCLUDE Files



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

Tutorial Overview

1. Start with a .bdf or .dat file
2. Use the SOL 200 Web App to:
 - Upload a BDF or DAT file to a remote operating system
 - Execute MSC Nastran on the remote operating system
 - Inspect the LOG, F06 and F04 during the MSC Nastran run
 - Download the result files from the remote system

Special Topics Covered

Remote Execution of MSC Nastran - Traditionally, an FTP program is necessary to upload files to a remote operating system on the local network and an SSH program is used to connect to the remote system and start the MSC Nastran program. The FTP program is then used to recover the result files from the remote system. The same workflow is achieved with the Remote Execution web app. With the Remote Execution web app, uploading input files, starting MSC Nastran and downloading result files is all done through a web browser.

SOL 200 Web App Capabilities

The Post-processor Web App and HDF5 Explorer are free to MSC Nastran users.

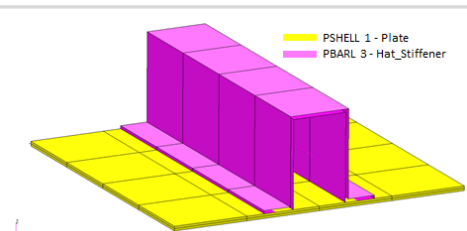
Compatibility

- Google Chrome, Mozilla Firefox or Microsoft Edge
- Windows and Red Hat Linux
- Installable on a company laptop, workstation or server. All data remains within your company.

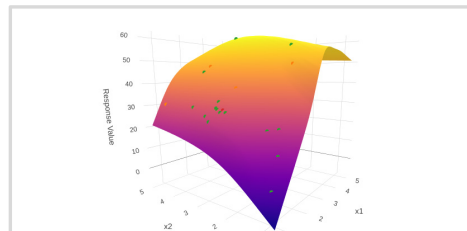
Web Apps

Benefits

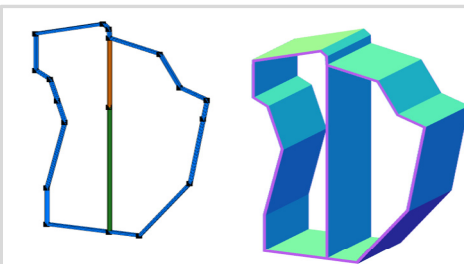
- REAL TIME error detection. 200+ error validations.
- REAL TIME creation of bulk data entries.
- Web browser accessible
- Free Post-processor web apps
- +80 tutorials



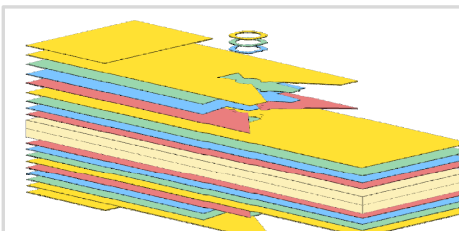
Web Apps for MSC Nastran SOL 200
Pre/post for MSC Nastran SOL 200.
Support for size, topology, topometry, topography, multi-model optimization.



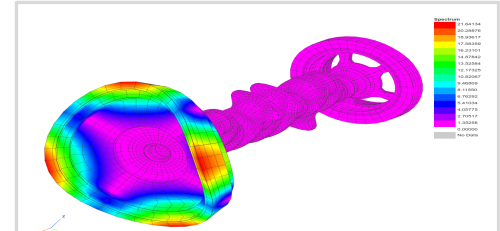
Machine Learning Web App
Bayesian Optimization for nonlinear response optimization (SOL 400)



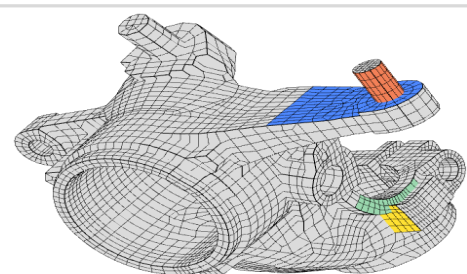
PBMSECT Web App
Generate PBMSECT and PBRSECT entries graphically



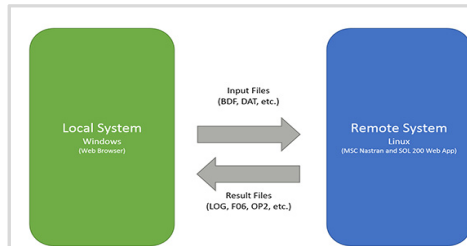
Ply Shape Optimization Web App
Optimize composite ply drop-off locations, and generate new PCOMPG entries



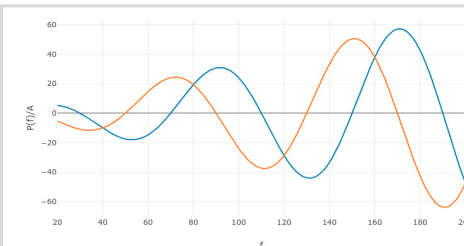
Post-processor Web App
View MSC Nastran results in a web browser on Windows and Linux



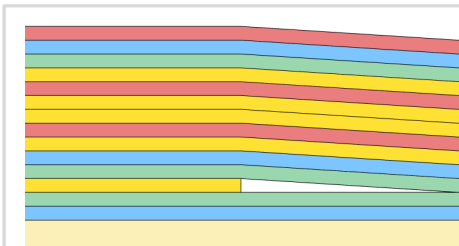
Shape Optimization Web App
Use a web application to configure and perform shape optimization.



Remote Execution Web App
Run MSC Nastran jobs on remote Linux or Windows systems available on the local network



Dynamic Loads Web App
Generate RLOAD1, RLOAD2 and DLOAD entries graphically



Stacking Sequence Web App
Optimize the stacking sequence of composite laminate plies



HDF5 Explorer Web App
Create graphs (XY plots) using data from the H5 file

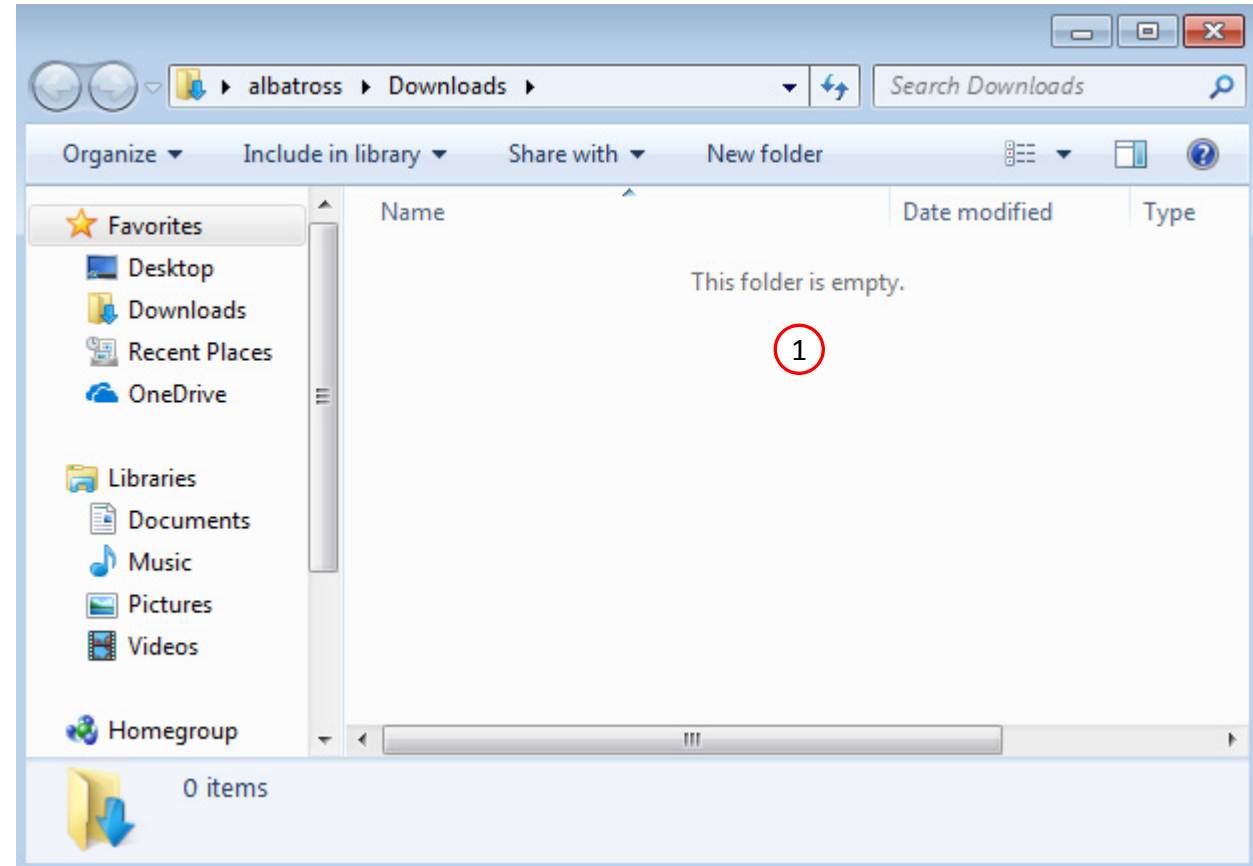
Part A

PERFORM AN MSC NASTRAN JOB REMOTELY

Before Starting

1. Ensure the Downloads directory is empty in order to prevent confusion with other files

- Throughout this workshop, you will be working with multiple file types and directories such as:
 - .bdf/.dat
 - nastran_working_directory
 - .f06, .log, .pch, .h5, etc.
- To minimize confusion with files and folders, it is encouraged to start with a clean directory.



Go to the User's Guide

1. Click on the indicated link

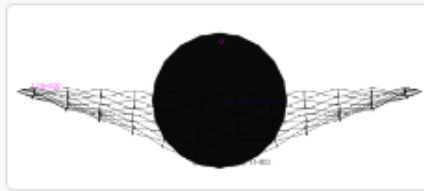
- The necessary BDF files for this tutorial are available in the Tutorials section of the User's Guide.



Obtain Starting Files

1. Find the indicated example
2. Click Link
3. The starting file has been downloaded

- Any MSC Nastran input file, e.g. BDF, DAT, etc., may be used for this exercise. You are encouraged to repeat this exercise with your own input files.



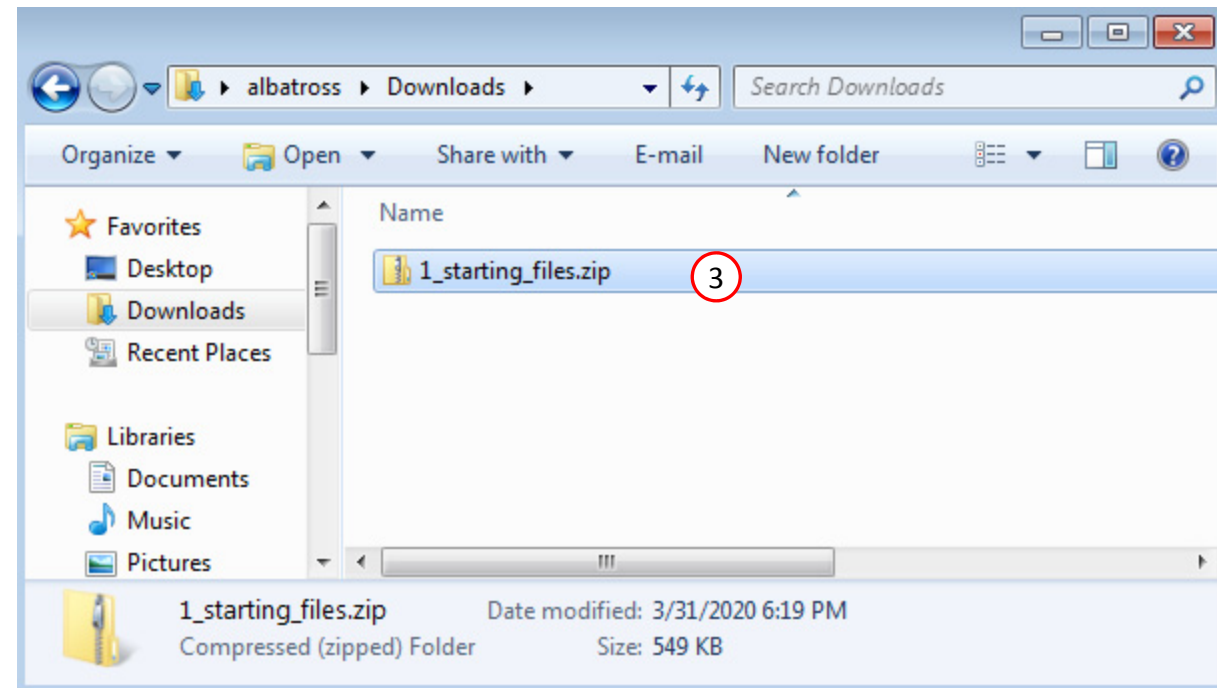
Parameter Study, Dynamic Impact of a Rigid Sphere on a Woven Fabric 1

Consider a transient analysis of a rigid sphere impacting a woven fabric. The parameters allowed to vary include the friction coefficients. The response of interest are the displacements.

This tutorial describes how to configure multiple MSC Nastran runs to generate training data. Gaussian process regression is used to train a surrogate model and make predictions. The prediction performance of the surrogate model is also evaluated. Also discussed are instructions to create displacement vs. time plots .

Starting Files [Link](#) 2

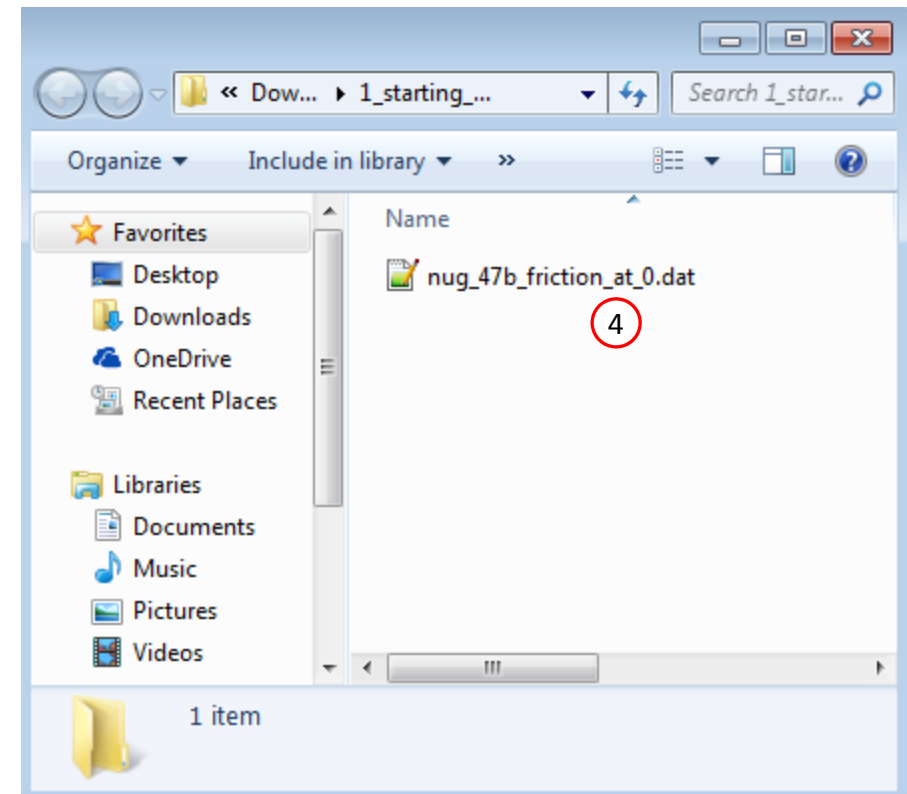
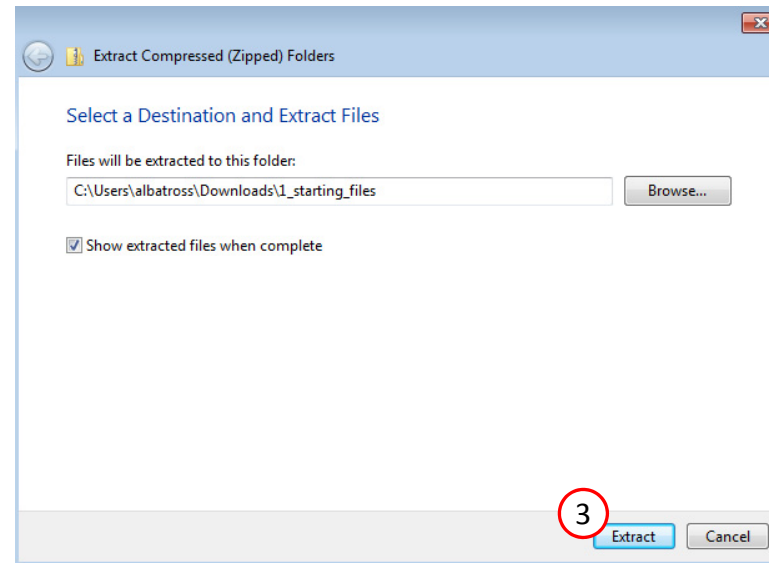
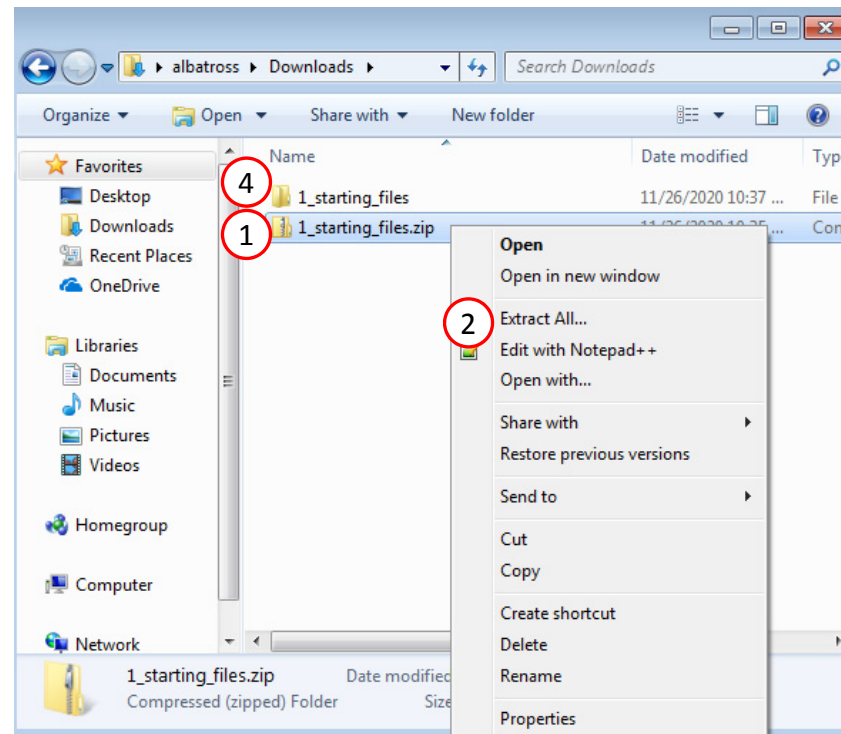
Solution BDF Files: [Link](#)



Obtain Starting Files

1. Right click on the zip file
2. Select Extract All...
3. Click Extract
4. The starting files are now available in a folder

- The starting files for this tutorial are contained in a ZIP file and must be extracted as shown.



Open the Correct Page

1. Click on the indicated link

- MSC Nastran can perform many optimization types. The SOL 200 Web App includes dedicated web apps for the following:
 - Optimization for SOL 200 (Size, Topology, Topometry, Topography, Local Optimization, Sensitivity Analysis and Global Optimization)
 - Multi Model Optimization
 - Machine Learning
- The web app also features the HDF5 Explorer, a web application to extract results from the H5 file type.



Select a Location

1. The Remote Execution web app is now open
2. Select a location to store the working directory
3. Optionally, select a subdirectory in which to store the working directory
4. The full path of the working directory on the remote system is displayed

The working directory is the directory that will contain the uploaded input files (BDF, DAT, etc.) and the location where the MSC Nastran job is performed.



Select a Location

Location of Job on Remote System

2 ▼

Your Subdirectory of Job on Remote System (Optional)

3 ▼

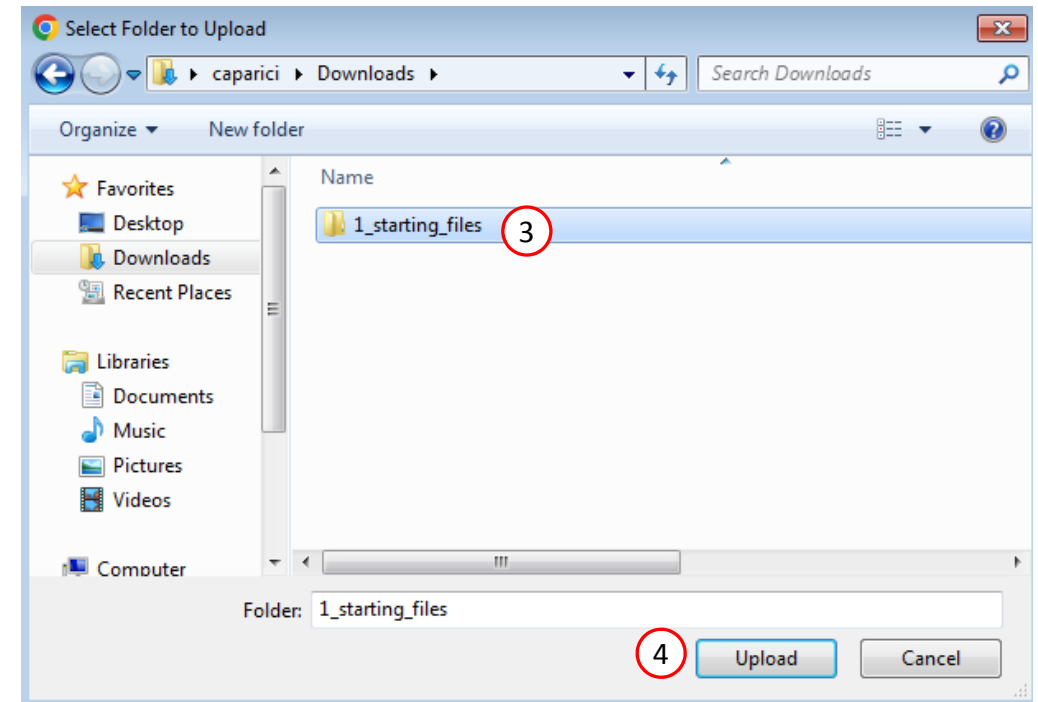
Full Location on Remote System

4

1. Click Upload Input Files
2. Click Select Directory
3. Select the directory named 1_starting_files
4. Click Upload
5. You are asked to confirm the directory selection. Click Upload in the confirmation box.
6. Click Upload files
7. Optionally, mark the checkbox for List of Selected Files to see a full list of files uploaded to the remote system

- Option 1 – Directory Upload – This option is recommended if there are multiple INCLUDE files located in multiple nested subdirectories. This will upload all files in the selected directory. Exercise caution to avoid uploading possibly large and unnecessary files.
- Option 2 – Individual Input File Upload - This option is recommended if there is only one input file or the INCLUDE files are at the same directory level.

See the Appendix for a list of supported INCLUDE entry formats.



Upload Input Files – Option 2 – Individual Input File Upload

1. Click Upload Input Files
2. Click Select files
3. Select the file nug_47b_friction_at_0.dat or any other files to upload to the remote system. If there are INCLUDE files, also select these files. Select all the files necessary to run MSC Nastran on the remote system.
4. Click Open
5. Click Upload files
6. Optionally, mark the checkbox for List of Selected Files to see a full list of files uploaded to the remote system

There are 2 options to download the MSC Nastran input files.

- Option 1 – Directory Upload – This option is recommended if there are multiple INCLUDE files located in multiple nested subdirectories. This will upload all files in the selected directory. Exercise caution to avoid uploading possibly large and unnecessary files.
- Option 2 – Individual Input File Upload - This option is recommended if there is only one input file or the INCLUDE files are at the same directory level.

See the Appendix for a list of supported INCLUDE entry formats.

Upload Input Files

Select Directory

2

1. Select files nug_47b_friction_at_0.dat

Inspecting: 100%

5

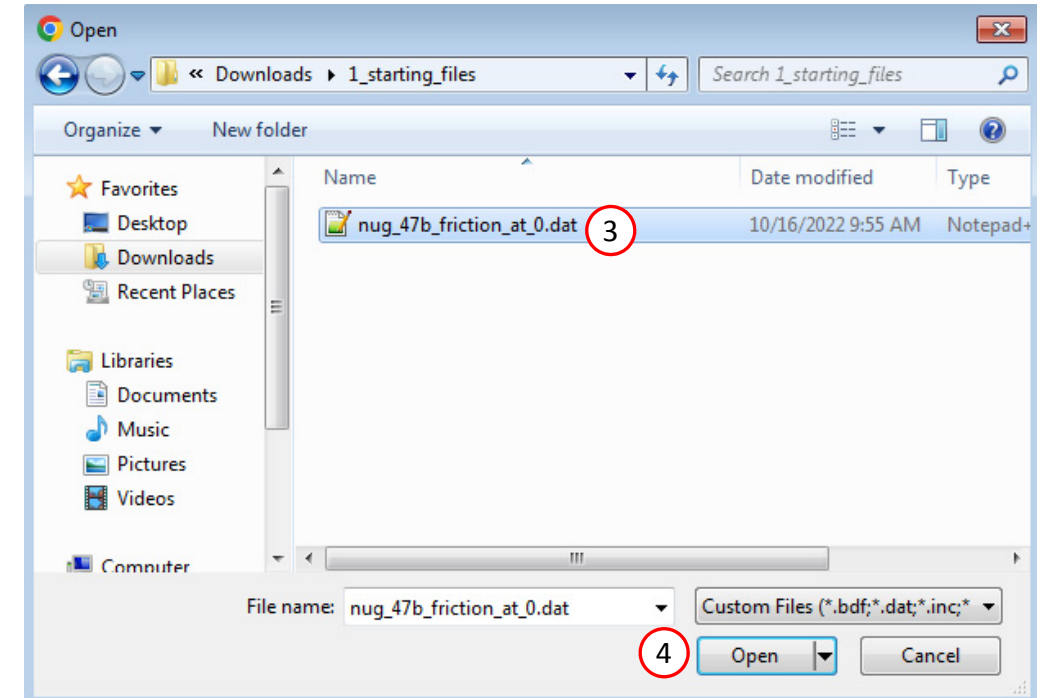
2. Upload files

Uploading: 100 % Complete

6

☒ List of Selected Files

File Name	File Size [Bytes]	Bytes Read	Progress
nug_47b_friction_at_0.dat	357837	357837	100%



Configuration and Run

1. Click Configuration and Run
2. You can configure the product version, program, input file, keywords and other options for this run.
3. You can also provide a description of this run. This is useful to differentiate between different runs.
4. A preview of the command that will be executed on the remote system is displayed.
5. Click Run MSC Nastran Job to start the remote run
6. Live output of the MSC Nastran job on the remote system is displayed

SOL 200 Web App - Remote Execution Select a Location Upload Input Files **Configuration and Run** Result Files [Configure New Remote Execution](#) [Remote Execution Manager](#) [User's Guide](#) [Home](#)

Configuration and Run

Product Version Command

msc20222

Program

nastran

Input File

nug_47b_friction_at_0.dat

Keywords

old=no news=no

Keyword batch=no automatically added for Linux remote systems

[+ Options](#)

Description of Run (Optional)

Dynamic impact of a sphere on a woven fabric

Command to Execute on Remote System

msc20222 nastran nug_47b_friction_at_0.dat old=no news=no batch=no

[Run MSC Nastran Job](#) Running

Terminal Output

```
$$ Path of working directory on the remote system:
$$ /scratch/remote_jobs/2022117_90602

$ msc20222 nastran nug_47b_friction_at_0.dat old=no news=no batch=no
$$ MSC_LICENSE_FILE: 27500@apollo:27500@localhost
$$ PID of process: 25553
MSC Nastran V2022.2 (Intel Linux 5.15.0-52-generic) Mon Nov 7 09:38:36 2022

*** SYSTEM INFORMATION MESSAGE (pgm: nastran, fn: estimate_job_requirements)
Starting ESTIMATE, please wait...

*** USER INFORMATION MESSAGE (pgm: nastran, fn: estimate_job_requirements)
Estimated bpool=6243.4MB
Estimated DOF=8496
Estimated memory=7940.0MB
Estimated disk=1800.0MB
MSC Nastran beginning job nug_47b_friction_at_0.

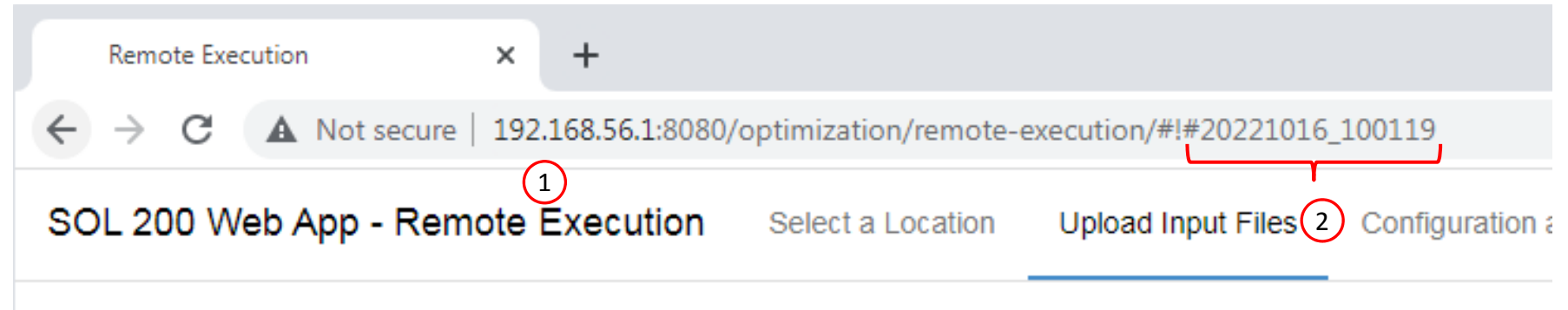
$$ Run status: Running

$$ - Message generated by the remote system
```

URL

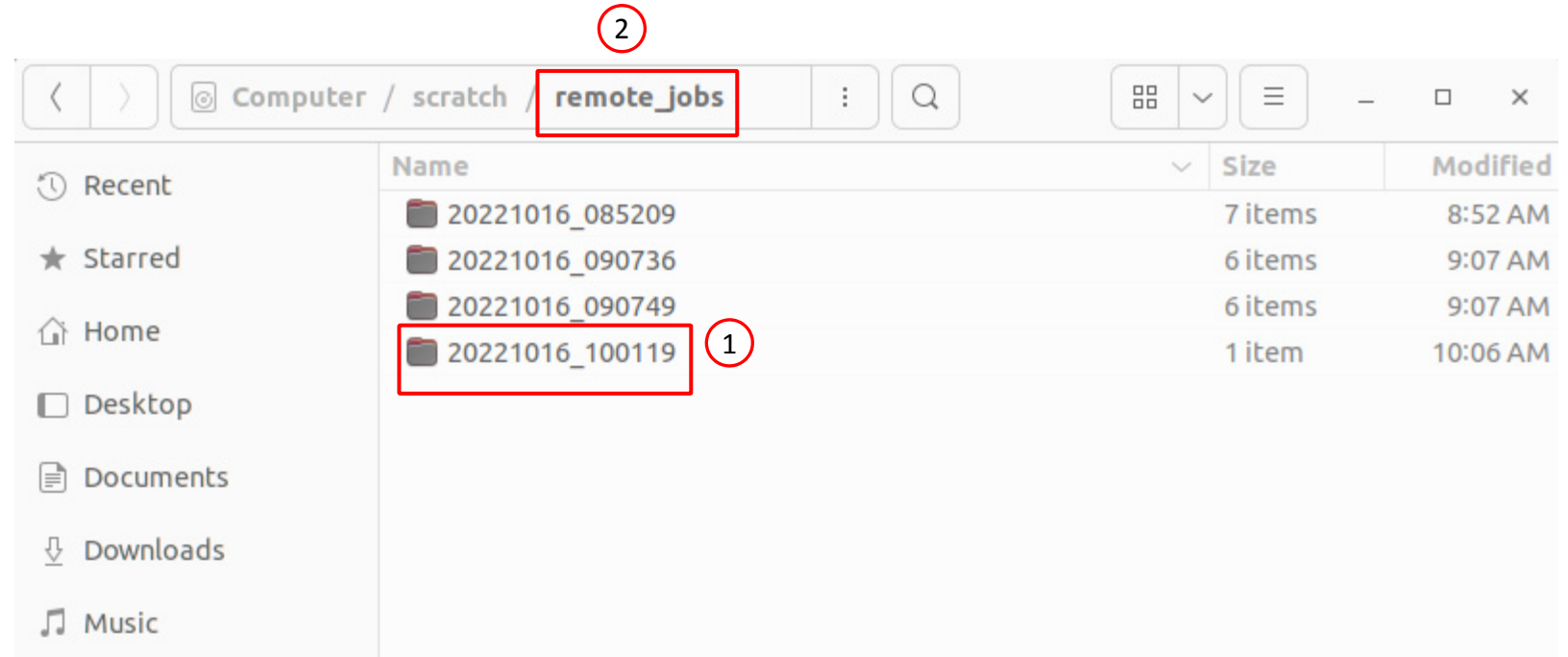
1. The URL address is updated. To run this job in the future, return to this URL address. You may bookmark or save this address.
2. The URL contains this hash:
#20221016_100119

Your hash will be different.



Storage of Input Files on Server

1. The remote system now has this directory: 20221016_100119. The name formatting corresponds to the year (YYYY), month (MM), day (DD), hour (hh), minute (mm) and second (ss): YYYYMMDD_hhmmss. When you perform this workshop, the directory name will vary.
2. Note that this working directory is located in the remote_jobs directory, which was specified at the beginning of the process. The list of locations will vary for each remote system.



Result Files

1. Click Result Files
2. Click on the F06 to display the contents of the file
3. Use the vertical scroll bar to navigate the text file
4. The text of the F06 file is automatically updated during the MSC Natran job
5. Click any other LOG, F04 or F06 to inspect the text of this file

Result Files

LOG

nug_47b_friction_at_0.f06

nug_47b_friction_at_0.log

Note: Only the last few lines are displayed

F04

nug_47b_friction_at_0.f04

F06

nug_47b_friction_at_0.f06

TIME = 1.985000E-04

FORCES OF SINGLE-POINT CONSTRAINT

POINT ID.	TYPE	T1	T2	T3	R1	R2	R3
1	G	4.362519E+01	1.306288E+02	0.0	0.0	0.0	0.0
2	G	-1.276859E+02	1.611811E+00	-4.519454E+01	2.027950E-02	8.946642E-03	2.270454E-02
3	G	2.465319E+02	2.360319E+01	4.561105E+01	4.961704E-02	-2.048842E-02	-8.352369E-02
4	G	2.314823E+01	-2.309463E+02	3.528220E+01	-2.704371E-02	-4.715806E-02	-8.164984E-02
5	G	1.135891E+00	1.024694E+02	-2.481102E+01	-5.555241E-03	-1.929728E-02	2.436795E-02
124	G	-4.040084E+02	-1.342832E+01	1.503836E+02	1.067114E-02	-7.276766E-02	-3.912367E-02
184	G	1.042880E+02	-1.020240E+01	-2.675188E+01	3.464367E-02	5.296304E-02	5.893936E-02
185	G	-2.572273E+02	-2.279072E+01	3.261737E+01	2.306286E-02	-1.749597E-01	-4.465299E-02
186	G	-2.951516E+02	-6.211160E+01	2.867029E+02	3.558413E-02	-5.159890E-01	-4.450316E-02
187	G	-9.483437E+02	1.508602E+01	3.116636E+02	-4.812830E-02	-5.472735E-01	-5.471119E-02
188	G	-3.655498E+02	-5.709214E+00	1.228275E+02	3.424826E-03	-3.369812E-01	-2.117588E-02
189	G	-1.134029E+02	6.294106E+00	-1.565003E+01	-4.004532E-02	-6.456988E-02	4.739713E-02
485	G	3.681830E+02	9.697448E+00	8.787497E+01	5.487184E-02	3.272712E-02	-3.422802E-02
486	G	6.679012E+02	-2.630421E+01	2.982553E+02	-2.073778E-02	1.814849E-01	-1.614649E-02
487	G	8.632602E+02	-6.271636E+01	3.972993E+02	-1.043278E-01	1.896109E-01	1.770143E-01
488	G	2.850443E+02	-3.239280E+01	1.908748E+02	-4.647548E-02	1.904222E-01	1.146358E-01
489	G	3.992737E+02	1.781226E+01	1.601488E+02	-1.148301E-02	8.120826E-02	-4.011226E-02
490	G	-3.105767E+02	3.685235E+01	2.108794E+02	4.693600E-02	-2.005158E-01	1.225512E-01
491	G	-9.468780E+02	5.802279E+01	4.242766E+02	9.057310E-02	-1.854430E-01	1.760918E-01
492	G	-5.350399E+02	-6.366907E+00	2.596260E+02	1.359184E-03	-1.906737E-01	-5.725746E-02
493	G	-3.380611E+02	-2.729593E+01	9.229367E+01	-5.753464E-02	-4.787372E-02	-7.540685E-02
494	G	-2.447534E+02	-2.776672E+01	4.899188E+01	-5.000737E-02	1.534931E-02	-8.611831E-02
790	G	4.016677E+02	7.994672E+00	1.212336E+02	-4.222818E-03	3.362160E-01	-2.967618E-02
791	G	9.613474E+02	-4.492280E+00	3.431635E+02	5.380826E-02	5.716788E-01	-4.364280E-02
792	G	2.334666E+02	1.600758E+01	2.547831E+02	-5.771824E-02	4.824246E-01	2.514463E-02
793	G	2.735603E+02	1.703443E+01	1.165213E+01	-2.290039E-02	1.570662E-01	-4.154104E-02
794	G	1.256715E+02	6.323884E+00	-3.798432E+01	-2.364753E-02	-4.146226E-04	1.290342E-02

Configuration and Run

1. Click Configuration and Run
2. Wait until the MSC Nastran analysis is complete
 - This analysis typically takes 5-10 minutes depending on the hardware and operating system

SOL 200 Web App - Remote Execution Select a Location Upload Input Files **Configuration and Run** Result Files [Configure New Remote Execution](#) [Remote Execution Manager](#) [User's Guide](#) [Home](#)

Configuration and Run

Product Version Command
msc20222

Program
nastran

Input File
nug_47b_friction_at_0.dat

Keywords
old=no news=no

[+ Options](#)

Description of Run (Optional)
Dynamic impact of a sphere on a woven fabric

Command to Execute on Remote System
msc20222 nastran nug_47b_friction_at_0.dat old=no news=no

[Run MSC Nastran Job](#) Complete

Terminal Output

```
$$ Path of working directory on the remote system:
$$ C:\SCRATCH\remote_jobs\caparici\20230602_091208

$ msc20222 nastran nug_47b_friction_at_0.dat old=no news=no
$$ MSC_LICENSE_FILE: 27500@192.168.56.1
$$ PID of process: 2336
MSC Nastran V2022.2 (Intel Windows 7 Professional 6.1 7601) Fri Jun  2 09:12:54 2023

*** SYSTEM INFORMATION MESSAGE (pgm: nastran, fn: estimate_job_requirements)
Starting ESTIMATE, please wait...
MSC Nastran beginning job nug_47b_friction_at_0.
MSC Nastran started  Fri Jun  2 09:12:55 PDT 2023
MSC Nastran finished Fri Jun  2 09:20:43 PDT 2023
MSC Nastran job nug_47b_friction_at_0 completed.***

*** USER INFORMATION MESSAGE (pgm: nastran, fn: estimate_job_requirements)
Estimated bpool=352.0MB
Estimated DOF=8496
Estimated memory=2048.5MB
Estimated disk=1800.0MB
```

\$\$ - Message generated by the remote system

Files on Server

1. Click Result Files
2. Scroll to the section titled Files on Remote System
3. A table is displayed that lists all the files contained in the working directory on the remote system
4. The files on the remote system may be downloaded. Click Download to download the respective file. Inspect your Download directory for the downloaded file.
5. Click Toggle Checkboxes. All the visible files have been selected.
6. Optionally, in the first column of the table, modify the selected checkboxes to your preference.
7. Click Download Selected Files
8. The selected files have been downloaded and contained in a ZIP file. The previous LOG file has also been downloaded.
9. Open the LOG file in a text editor.
10. If the remote operating system is Linux, it will say Linux as the top of the LOG file. If the remote system is Windows, then it will say Windows at the top of the LOG file.
11. If an H5 file was created, the HDF5 Explorer may be opened to create XY plots. Click View Results – HDF5 Explorer to open the explorer.

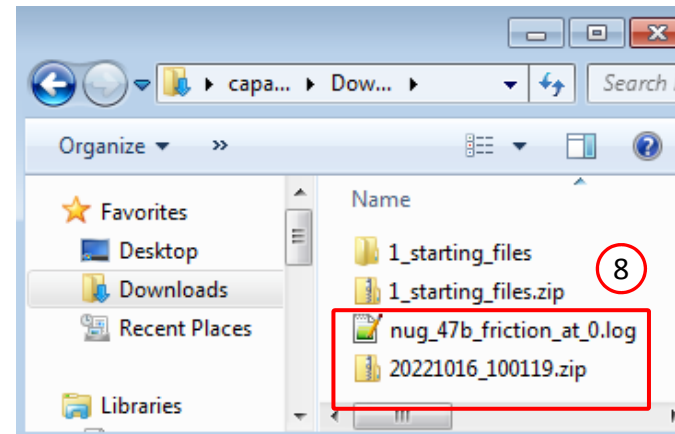
Files on Remote System

Reset Table Filters

Toggle Checkboxes

Download Selected Files

	File Name	File Size [Bytes]	File Extension	Download Link	Results Link
6	<input type="text" value="Search"/>		<input type="text" value="Search"/>		
<input checked="" type="checkbox"/>	nug_47b_friction_at_0.dat	357837	.dat	Download	
<input checked="" type="checkbox"/>	nug_47b_friction_at_0.f04	10457839	.f04	Download	
<input checked="" type="checkbox"/>	nug_47b_friction_at_0.f06	77508408	.f06	Download	
<input checked="" type="checkbox"/>	nug_47b_friction_at_0.h5	62631590	.h5	Download	View Results - HDF5 Explorer
<input checked="" type="checkbox"/>	nug_47b_friction_at_0.log	8432	.log	Download	
<input checked="" type="checkbox"/>	nug_47b_friction_at_0.sts	55287	.sts	Download	



```
1 MSC Nastran V2022.2 (Intel Linux 5.15.0-50-generic) Control File:
2 -----
3 Nastran BUFFSIZE=32769 $ (/msc/MSC_Nastran/2022.2/conf/nast2022rc[4])
4 $ $ (/msc/MSC_Nastran/2022.2/conf/nast2022rc[6])
5 $ $ (/msc/MSC_Nastran/2022.2/conf/nast2022rc[14])
6 $ End $ (/msc/MSC_Nastran/2022.2/conf/nast2022rc[16])
7 JID=./nug_47b_friction_at_0.dat
8 OUT=./nug_47b_friction_at_0
9 PWDDIR=/scratch/remote_jobs/20221016_100119
10 MEM=7940MB $
11 MACH='Intel'
12 OPER='Linux'
13 OSV='5.15.0-50-generic'
14 MODEL='Intel(R) Core(TM) i7-2620M CPU @ 2.70GHz (apollo)'
15 CONFIG=186640
```

Plot - NODAL/SPC_FORCE - Plot #: 0 - ID: 1, 2, 3, ... | SAMPLE: nug_47b_friction_at_0 | SUBCASE: 1 | STEP: 1 | MAGTRANS vs. TIME_FREQ_EIGR



Vertical Axis



Magnitude of Translation

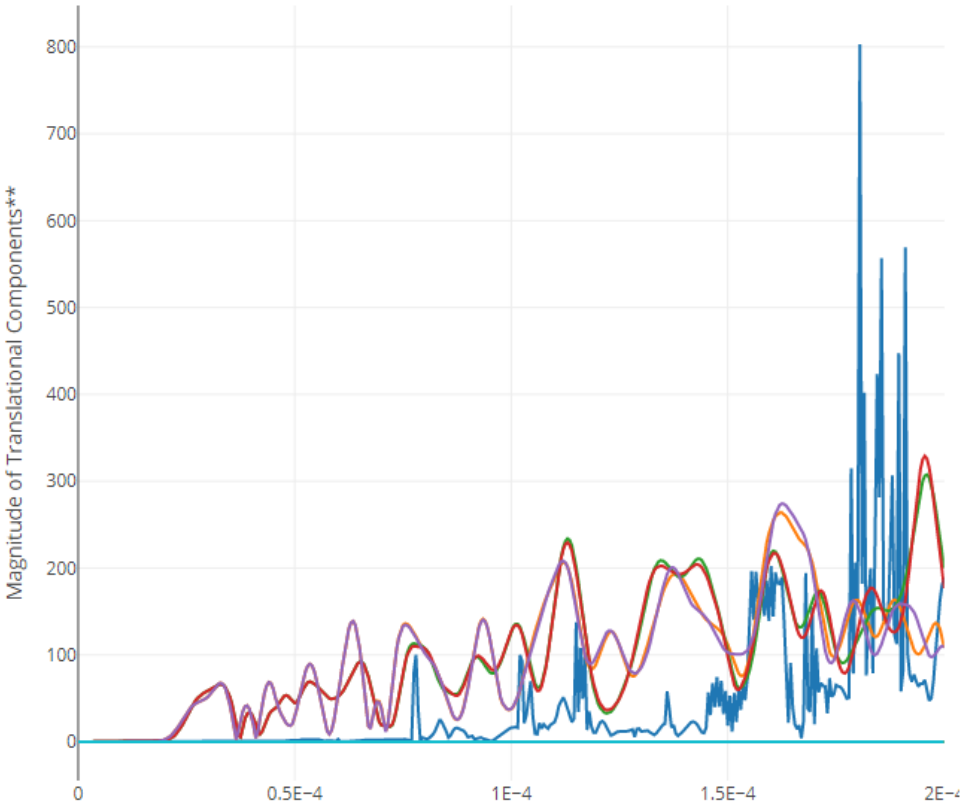
Horizontal Axis

TIME_FREQ_EIGR - TI

+ Options

1

NODAL/SPC_FORCE



TIME_FREQ_EIGR - Time, frequency or real part of eigen value

Display None Display All

Display	Color	Name
<input checked="" type="checkbox"/>	Blue	0 - ID: 1 SAMPLE: nug_47b_friction_at_0 SUBCASE: 1 STEP: 1
<input checked="" type="checkbox"/>	Orange	1 - ID: 2 SAMPLE: nug_47b_friction_at_0 SUBCASE: 1 STEP: 1
<input checked="" type="checkbox"/>	Green	2 - ID: 3 SAMPLE: nug_47b_friction_at_0 SUBCASE: 1 STEP: 1
<input checked="" type="checkbox"/>	Red	3 - ID: 4 SAMPLE: nug_47b_friction_at_0 SUBCASE: 1 STEP: 1
<input checked="" type="checkbox"/>	Purple	4 - ID: 5 SAMPLE: nug_47b_friction_at_0 SUBCASE: 1 STEP: 1
<input checked="" type="checkbox"/>	Brown	5 - ID: 6 SAMPLE: nug_47b_friction_at_0 SUBCASE: 1 STEP: 1
<input checked="" type="checkbox"/>	Pink	6 - ID: 7 SAMPLE: nug_47b_friction_at_0 SUBCASE: 1 STEP: 1
<input checked="" type="checkbox"/>	Grey	7 - ID: 8 SAMPLE: nug_47b_friction_at_0 SUBCASE: 1 STEP: 1
<input checked="" type="checkbox"/>	Yellow	8 - ID: 9 SAMPLE: nug_47b_friction_at_0 SUBCASE: 1 STEP: 1
<input checked="" type="checkbox"/>	Cyan	9 - ID: 10 SAMPLE: nug_47b_friction_at_0 SUBCASE: 1 STEP: 1

HDF5 Explorer

- If you clicked on View Results – HDF5 Explorer in the Remote Execution web app, the HDF5 Explorer is opened and plots will automatically be created.

Open the Remote Execution Manager

1. Return to the Remote Execution web app
2. Click Configuration and Run
3. Click Run MSC Nastran Job to rerun the job
4. Click Remote Execution Manager

SOL 200 Web App - Remote Execution 1 Select a Location Upload Input Files 2 Configuration and Run Result Files 4 Configure New Remote Execution Remote Execution Manager User's Guide Home

Configuration and Run

Product Version Command
msc20222

Program
nastran

Input File
nug_47b_friction_at_0.dat

Keywords
old=no news=no
Keyword batch=no automatically added for Linux remote systems

MSC_LICENSE_FILE

License servers found on remote system: 27500@apollo:27500@localhost

Description of Run (Optional)
Dynamic impact of a sphere on a woven fabric

Command to Execute on Remote System
msc20222 nastran nug_47b_friction_at_0.dat old=no news=no batch=no

Run MSC Nastran Job Running

Terminal Output 3

```
$$ Path of working directory on the remote system:
$$ /scratch/remote_jobs/20221016_100119

$ msc20222 nastran nug_47b_friction_at_0.dat old=no news=no batch=no

$$ Run status: Running
```


Remote Execution Manager

1. The Remote Execution Manager is open and helps you manage existing jobs that are running or complete.
2. The job that was submitted in this workshop is displayed in the table and its status is currently Running. If the job is complete, the status is set to Complete. Note the newest jobs are displayed at the top of the table.
3. The description provided earlier helps to differentiate the run from the other runs.
4. Buttons to stop the run or remove the run, including deleting the result files, is available.
5. If you want to rerun a job or access the result files, click Open for the respective job.
6. Filter options are available to filter the table.
7. Click Reset Table Filters to display all the original rows of the table.
8. Options to stop or remove multiple jobs are available. Removal of jobs is not reversible.

SOL 200 Web App - Remote Execution Manager 1

[Configure New Remote Execution](#) [User's Guide](#) [Home](#)

List of Jobs

Filter table by Status
Complete
Running

Filter table by Location
/scratch/remote_jobs 6

[Update List of Jobs](#) [Reset Table Filters](#) [Select the visible jobs](#) [Remove selected jobs](#) [Stop selected jobs](#) 8

Directory Name of Job	Location	Subdirectory	Description of Job	Terminal Output	Status	Remove Job	Stop Run	View Results or Configure Job
<input type="text" value="Search"/>			<input type="text" value="Search"/>					
<input checked="" type="checkbox"/> 20221016_100119	/scratch/remote_jobs	not set	Dynamic impact of a sphere on a woven fabric 3	<pre>\$\$ Path of working directory on the remote system: \$\$ /scratch/remote_jobs/20221016_100119 \$ msc20222 nastran nug_47b_friction_at_0.dat old=no news=no batch=no \$\$ PID of process: 36708 MSC Nastran V2022.2 (Intel Linux 5.15.0-50-generic) Sun Oct 16 10:28:33 2022 *** SYSTEM INFORMATION MESSAGE (pgm: nastran, fn: estimate_job_requirements) Starting ESTIMATE, please wait... *** USER INFORMATION MESSAGE (pgm: nastran, fn: estimate_job_requirements) Estimated bpool=6243.4MB Estimated DOF=8496 Estimated memory=7940.0MB Estimated disk=1800.0MB MSC Nastran beginning job nug_47b_friction_at_0. \$\$ Run status: Running</pre>	Running 2		Stop 4	Open 5

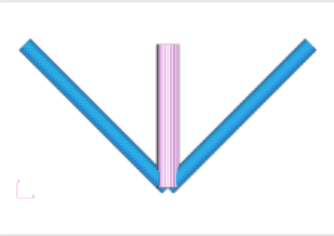
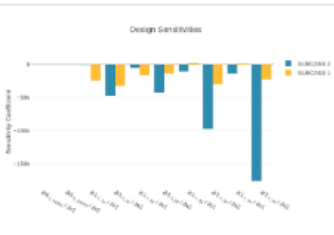
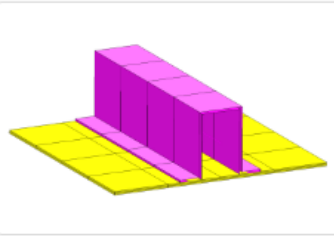
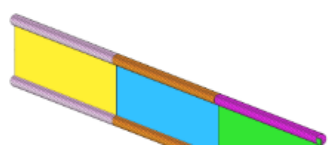
Part B

PERFORM A SOL 200 JOB REMOTELY

Perform an Optimization Remotely

1. Download the solution BDF files for any optimization example available in the tutorials section of the User's Guide

Size Optimization Tutorials

	Title and Description	PDF Tutorial	YouTube Tutorial
	Structural Optimization of a 3 Bar Truss - MSC Nastran Optimization A truss structure is optimized with MSC Nastran. The design variables are the cross-sectional areas of the rod elements. The objective is to minimize the weight of the structure while ensuring the stress and displacements are within specified constraints. Starting BDF Files: Link Solution BDF Files: Link 1	Link	Link
	Sensitivity Analysis of a 3 Bar Truss - MSC Nastran Optimization A structural optimization was previously performed on a 3 bar truss. In this tutorial, the process to perform a sensitivity analysis is detailed. Starting BDF Files: Link Solution BDF Files: Link	Link	Link
	Automated Structural Optimization of a Stiffened Plate with MSC Nastran SOL 200/Design Optimization This example demonstrates the use of MSC Nastran to optimize the thickness of the plate and the thickness of a beam section to minimize weight. Constraints are imposed on the stresses in the shell and beam elements. Additional constraints are imposed on deflections. Starting BDF Files: Link Solution BDF Files: Link	Link	Link
	Vibration of a Cantilevered Beam (Turner's Problem), MSC Nastran Optimization This example demonstrates the use of MSC Nastran to optimize the rod areas and shell thicknesses such that the structure's weight is minimized and the first natural	Link	Link

Configure and Run MSC Nastran Remotely

1. Upload the solution BDF files to the Remote Execution web app (not shown)
2. Click +Options to view additional options for the MSC Nastran job
3. The variable MSC_LICENSE_FILE is automatically set to use every license option found in the RC files of each MSC Nastran installation. If the remote system has the environment variable MSC_LICENSE_FILE, this value is also used. The variable MSC_LICENSE_FILE may be customized.
4. For an optimization, the case control command maybe set to ECHO=PUNCH(NEWBULK) or the original ECHO found in the input file. With ECHO=PUNCH(NEWBULK), the PCH file will include updated bulk data entries after the optimization. The file with suffix _final.bdf will be created by the web app and contains the updated bulk data entries. If ECHO=PUNCH(NEWBULK) is not used, the updated file _final.bdf will not be created.
5. Click Run MSC Nastran Job

Configuration and Run

Product Version Command

msc20222

Program

nastran

Input File

model.bdf

Keywords

old=no

Keyword batch=no automatically added for Linux remote systems

+ Options

MSC_LICENSE_FILE

27500@apollo:27500@localhost

License servers found on remote system: 27500@apollo:27500@localhost

ECHO Configuration

Use ECHO=PUNCH(NEWBULK)

With ECHO=PUNCH(NEWBULK), a new BDF file may be created with optimized and updated entries. Use ECHO=PUNCH(NEWBULK) only with SOL 200 jobs.

Description of Run (Optional)

Command to Execute on Remote System

msc20222 nastran model.bdf old=no batch=no

Run MSC Nastran Job

Complete

5

Terminal Output

```
$$ Path of working directory on the remote system:
$$ /scratch/remote_jobs/2022117_90911

$ msc20222 nastran model.bdf old=no batch=no
$$ MSC_LICENSE_FILE: 27500@apollo:27500@localhost
$$ PID of process: 22560
MSC Nastran V2022.2 (Intel Linux 5.15.0-52-generic) Mon Nov 7 09:09:36 2022

*** SYSTEM INFORMATION MESSAGE (pgm: nastran, fn: estimate_job_requirements)
Starting ESTIMATE, please wait...

*** USER INFORMATION MESSAGE (pgm: nastran, fn: estimate_job_requirements)
Estimated memory=7940.0MB
Estimated bpool=1985.0MB
MSC Nastran beginning job model.
MSC Nastran job model completed.***

$$ Run status: Complete
```

\$\$ - Message generated by the remote system

Files on Server

1. Click Result Files
2. Scroll to the section titled Files on Remote System
3. A table is displayed that lists all the files contained in the working directory on the remote system

Since the BDF files were configured for SOL 200, an optimization was performed. Some of the optimization results may be post processed.

4. The optimization history, including the objective, constraints and design variables, may be plotted by clicking on View Results – Local Optimization.
5. After the optimization, the original BDF file has been updated to use the updated and optimized properties and is named model_final.bdf. Click Download to download the BDF file and inspect the updated bulk data entries.

Files on Remote System

Reset Table Filters

Toggle Checkboxes

Download Selected Files

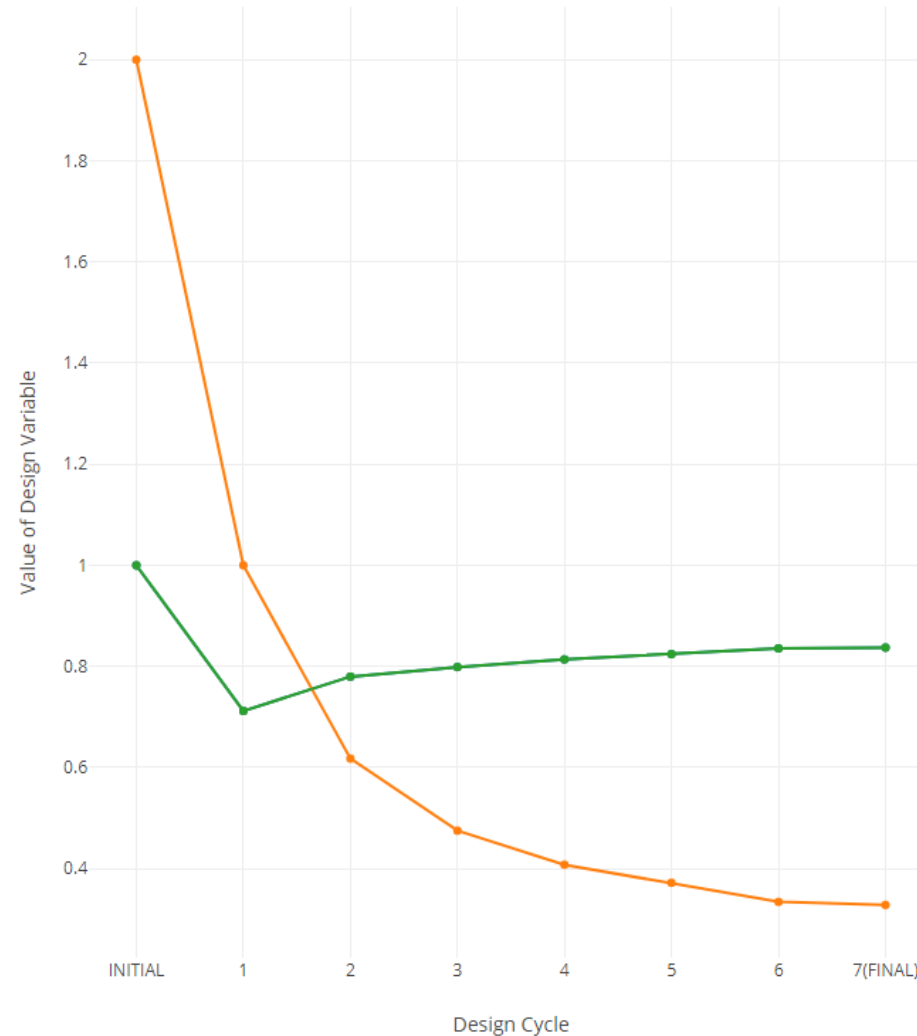
3	File Name	File Size [Bytes]	File Extension	Download Link	Results Link
	<input type="text" value="Search"/>		<input type="text" value="Search"/>		
<input type="checkbox"/>	design_model.bdf	5128	.bdf	Download	
<input type="checkbox"/>	model.bdf	2124	.bdf	Download	
<input type="checkbox"/>	model.f04	401872	.f04	Download	
<input type="checkbox"/>	model.f06	191664	.f06	Download	View Results - Local Optimization 4
<input type="checkbox"/>	model.log	13772	.log	Download	
<input type="checkbox"/>	model.op2	36980	.op2	Download	
<input type="checkbox"/>	model.pch	10600	.pch	Download	
<input type="checkbox"/>	model_final.bdf	10433	.bdf	5 Download	
<input type="checkbox"/>	optimization_results.csv	1082	.csv	Download	
<input type="checkbox"/>	terminal_output.log	719	.log	Download	

Local Optimization Results

1. If you clicked on View Results – Local Optimization in the Remote Execution web app, the optimization results are automatically displayed.

Design Variables

1


☐ Display None ☒ Display All

Display	Color	Label	Label Comments
<input type="checkbox"/>			
<input checked="" type="checkbox"/>	Blue	x1	A, Area of the rod, of PROD 11 (Truss_Member-Type-11)
<input checked="" type="checkbox"/>	Orange	x2	A, Area of the rod, of PROD 12 (Truss_Member-Type-12)
<input checked="" type="checkbox"/>	Green	x3	A, Area of the rod, of PROD 13 (Truss_Member-Type-13)

Files on Server

Additional links are available depending on which result files are available.

1. If sensitivity coefficients are available in the CSV file, the sensitivities may be plotted by clicking on View Results – Sensitivities.

If the BDF file is configured to output an H5 file, the H5 file may be post processed.

2. To create plots using the H5 file, click View Results - HDF5 Explorer.

Files on Remote System

Reset Table Filters

Toggle Checkboxes

Download Selected Files

File Name	File Size [Bytes]	File Extension	Download Link	Results Link
<input type="text" value="Search"/>		<input type="text" value="Search"/>		
<input type="checkbox"/> design_model.bdf	5128	.bdf	Download	
<input type="checkbox"/> fort.11	1352	.11	Download	
<input type="checkbox"/> model.bdf	2119	.bdf	Download	
<input type="checkbox"/> model.f04	418629	.f04	Download	
<input type="checkbox"/> model.f06	218501	.f06	Download	View Results - Local Optimization
<input type="checkbox"/> model.h5	170529	.h5	Download	View Results - HDF5 Explorer
<input type="checkbox"/> model.log	13104	.log	Download	
<input type="checkbox"/> model.op2	37564	.op2	Download	
<input type="checkbox"/> model.pch	10542	.pch	Download	
<input type="checkbox"/> model_final.bdf	10502	.bdf	Download	
<input type="checkbox"/> optimization_results.csv	4559	.csv	Download	View Results - Sensitivities
<input type="checkbox"/> terminal_output.log	607	.log	Download	

End of Tutorial

Appendix

Appendix Contents

- Options for Remote Execution
- Notable Behaviors of the SOL 200 Web App
- Remote Execution Manager
- INCLUDE Files

Options for Remote Execution

OPTION A

- The URL to access the SOL 200 Web App appears like this:

- 192.168.56.1:8080/optimization
- remote-system-skynet:8080/optimization

The IP address or the hostname of the remote system will vary depending on your configuration.

- The SOL 200 Web App and MSC Nastran must be installed on the remote system

OPTION B

- The URL to access the SOL 200 Web App appears like this:

- localhost:8080/optimization
- The SOL 200 Web App and MSC Nastran must be installed on the local system
- Some users may find this option redundant. The Remote Execution web app is ideally used in option A.
- Use the URL address to help differentiate which option is being used



Notable Behaviors of the SOL 200 Web App

When the SOL 200 Web App is left running overnight, at 3:00AM and each night, the SOL 200 Web App will perform the following:

- The web app will scan the remote system for any new MSC Nastran installations. In the Remote Execution web app, the latest versions of MSC Nastran will be selectable.
- The web app will scan the remote system for any new users. In the Remote Execution web app, the list of subdirectories will be updated to match the list of users on the remote operating system.

SOL 200 Web App Shutdown

- In the event the SOL 200 Web App were shutdown, any existing MSC Nastran jobs will continue to run unaffected. The goal is to preserve and protect any currently running MSC Nastran jobs. You can test this functionality as follows.
 1. Run the web app with: `node app.min.js`
 2. Open the Remote Execution web app and start a job that spans multiple minutes.
 3. Stop the web app that was started with: `node app.min.js`
 4. Inspect the list of processes on your operating system and you will see that MSC Nastran is still running

Remote Execution Manager

Only a subset of jobs are visible when using the Remote Execution Manager. The subset of jobs is determined by the Subdirectory that was selected during the last remote job.

1. Scroll to the very bottom left corner of the Remote Execution Manager and mark the checkbox Display All Subdirectories. This will give you access to all the jobs that have been configured with the Remote Execution Manager.
2. A new filter box is visible and allows you to filter the table by Subdirectory.

List of Jobs

Filter table by Status
Complete
Run terminated

Filter table by Location
/scratch/remote_jobs

Filter table by Subdirectory
apricot
caparici
not set

Update List of Jobs Reset Table Filters Select the visible jobs Remove selected jobs Stop selected jobs

Directory Name of Job	Location	Subdirectory	PID	Description of Job	Terminal Output	Status	Remove Job	Stop Run	View Results or Configure Job
<input type="checkbox"/> 20221218_130026	/scratch/remote_jobs	not set	39498		<pre>\$\$ Path of working directory on the remote system: \$\$ /scratch/remote_jobs/20221218_130026 \$ msc20223 nastran dsoug1.dat old=no batch=no \$\$ MSC_LICENSE_FILE: 27500@apollo:27500@localhost \$\$ PID of process: 39498 MSC Nastran V2022.3 (Intel Linux 5.15.0-56-generic) Sun Dec 18 13:00:30 2022 *** SYSTEM INFORMATION MESSAGE (pgm: nastran, fn: estimate_job_requirements) Starting ESTIMATE, please wait... *** USER INFORMATION MESSAGE (pgm: nastran, fn: estimate_job_requirements) Estimated bpool=7197.2MB Estimated DOF=2 Estimated memory=7793.5MB Estimated disk=1.2MB MSC Nastran beginning job dsoug1. MSC Nastran job dsoug1 completed.ooo \$\$ Run status: Complete</pre>	Complete	<input type="button" value="Remove"/>	<input type="button" value="Open"/>	

1

☒ Display All Subdirectories

2

INCLUDE Files

The following INCLUDE formats are supported by the Remote Execution web app. The paths must be relative.

```
INCLUDE 'file_a.bdf'
INCLUDE './file_a.bdf'
INCLUDE './nested_directory/file_a.bdf'
```

The following INCLUDE formats are NOT supported by the Remote Execution web app.

```
INCLUDE
'C:\Users\usera\Downloads\nested_directory/file_a.bdf'
INCLUDE '/nested_directory/file_a.bdf'
INCLUDE '../nested_directory/file_a.bdf'
INCLUDE TPLDIR:'nested_directory/file_a.bdf'
```

INCLUDE formats that use backslashes (\) are NOT compatible on Linux. Pre-processors on Windows systems are known to create BDF files with INCLUDE entries that use backslashes. Exercise caution when uploading

BDF files from a Windows system to a Linux system. An alternative is to use forward slashes (/) which are compatible on both Windows and Linux systems. The following USER FATAL MESSAGE is a sign of incompatibility.

```
*** USER FATAL MESSAGE (fn: GETLIN)
A requested INCLUDE file was not found.
```

The Remote Execution web app allows you to download result files such as F06, LOG, etc. from the remote system. The nested directories on the remote system, which may contain the INCLUDE files, may not be downloaded in this web app version but will be addressed in a future release.

One alternative to using INCLUDE files is to combine all the files together. This can be done by MSC Nastran with the following command.

```
msc20224 nastran model.bdf expjid=yes
```

The use of `expjid=yes` generates a new BDF file named `model.exp` that has the contents of all INCLUDE files.