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HS-1020: Working with a Parameterized File Model for Size Variables

In this tutorial you will learn how to create a template file for size variables, and how to import them to HyperStudy. The input variables are the thickness of each of the three components, defined in the input deck via the PSHELL card. The thickness should be between 0.05 and 0.15; the initial thickness is 0.1 (shown below).

The sample base input template used in this tutorial can be found in <hst.zip>/HS-1020/. Copy the tutorial files from this directory to your working directory.



Figure 1: Double Symmetric Plate Model

Step 1: Perform the Study Setup

- 1. Start HyperStudy.
- 2. To start a new study, click **File** > **New** from the menu bar, or click \square on the toolbar.
- 3. In the **HyperStudy Add** dialog, enter a study name, select a location for the study, and click *OK*.
- 4. Go to the **Define Models** step.
- 5. Click Add Model.
- 6. In the Add HyperStudy dialog, select *Parameterized File* and click *OK*.
- 7. In the **Resource** column, click (...).
- 8. In the **Open File** dialog, open the plate.fem file. A HyperStudy dialog opens, informing you that there are no parameters found in the file.





- 9. Click **Yes** to parameterize the file. The plate.fem file opens in the **Editor**.
- 10. In the **Find** area, enter PSHELL.
- 11. Click ► three times. Three PSHELL cards containing the shell thickness of each component in the fourth field are highlighted.

Each field is eight characters long. The numbers need to be replaced with formatted Templex statements to mark an input variable.

1303	POREL Data
1384	\$HMNAME PROP ···· ···· ··· ··· ··· ·2 "shell" 4
1385	\$HWCOLOR PROP · · · · · · · · · · · · · · · · · · ·
1386	PSHELL
1387	\$HMNAME PROP ··································
1388	\$HWCOLOR PROP · · · · · · · · · · · · · · · · · · ·
1389	PSHELL
1390	\$HMNAME PROP ···· ··· ··· ··· ··· ··· ··· ··· ···
1391	\$HWCOLOR PROP · · · · · · · · · · · · · · · · · · ·
1392	PSHELL
1202	ee .

- 12. Starting at 0.1, highlight the first eight fields for thickness.
 - Tip: Quickly highlight 8-character fields by pressing *CTRL* to activate the **Selector** (set to 8 characters) and then clicking the value.

1001	VIRTURE PROF	4	SHETT A	
1385	\$HWCOLOR · PROP · · ·	· · · · · · · · · · · · · · · · 2	•••••3	
1386	PSHELL ······2	••••••2 <mark>0.1••••</mark>	· · · · · · · 2 1.0 · · · ·	·····20.833330.0···
1387	\$HMNAME PROP · · · ·	• • • • • • • • • • • • • • • • 3	"patch1" 4	
1388	\$HWCOLOR · PROP · · ·	· · · · · · · · · · · · · · · 3	· · · · · · · · 4	
1200	DOURTI	20.1	010	do obbando o

- 13. Right-click on the highlighted fields and select *Create Parameter* from the context menu.
- 14. In the Parameter varname_1 dialog, Label field, enter t1.
- 15. In the Format field, enter %8.5f.
- 16. Click OK.



Parameter: varname_1 - HyperStudy						
Label: t1						
Varname:	Varname: varname_1					
Lower	Bound	Nominal	Upper Bound			
0.09		0.10	0.11			
) Se	t percent:		+/-			
) Se	t value:		+/-			
Format:	%8.5f		-	4		
	OK	Cancel	Apply			

- 17. Click *OK* to close the **Editor**.
- 18. In the **Save Template** dialog, save the template file as plate.tpl. HyperStudy automatically populates the **Resource** column with the plate.tpl file, and the **Solver input file** column with the solver input file name plate.fem.
- 19. In the Solver execution script column, select OptiStruct (os).

Active	Label	Varname	Model Type	Resource	Solver input file	Solver execution script	Solver input argumer
1 🗸	Model 1	m_1	A Parameterized File	C://HS-4410/plate.tpl) plate.fem	OptiStruct (os)	\${file}

- 20. Click *Import Variables*. One input variables is imported from the plate.tpl resource file.
- 21. Go to the Define Input Variables step.
- 22. Review the input variable's lower and upper bound ranges.
- 23. Go to the Specification step.

Step 2: Perform the Nominal Run

- 1. In the work area, set the Mode to Nominal Run.
- 2. Click Apply.
- 3. Go to the Evaluate step.
- 4. Click *Evaluate Tasks*.



5. Go to the **Define Output Responses** step.

Step 3: Create and Define Output Responses

In this step you will create two output responses: Mass and Displacement.

- 1. Create the Mass output response.
 - a. From the **Directory**, drag-and-drop the plate.out file, located in approaches/nom_1/run_00001/m_1, into the work area.

Explorer Directory		🕉 Define Output Responses 🛛 🗍 Data
Name In	*	Add Output Response Remove Output
 m_1 plate_menu.html plate_frames.htm plate.stat plate.res plate.out plate.mvw 	ш	Active Label Varname

b. In the File Assistant dialog, set the Reading technology to *Altair® HyperWorks®* and click *Next*.





- c. Select Single item in a time series, then click Next.
- d. Define the following options, then click *Next*.
 - Set Type to Mass.
 - Set Request to Mass.
 - Set Component to Value.

🚽 File Assistant	t 💌
Single se	erial or time series
Subcase:	
Type:	Mass
Request:	Mass
Component:	Value
✓ Preview:	2.00000E-006 1.90000E-006 1.80000E-006 1.70000E-006 0.90 0.95 1.00 1.05 1.10 Index
	<back next=""> Cancel</back>

- e. Label the output response Mass.
- f. Set Expression to First Element.
 - **Note:** Because there is only a single value in this data source, [0] is inserted after m_1_ds_1, thereby choosing the first (and only) entry in the data source.



₫	File Assistar	nt		×				
	Create a Data Source and a Response							
Creating a new Data Source								
	F	Label:	Data Source 1					
	> -	Varname: n	n_1_ds_1					
	🔽 Linked t	o a new Resp	onse					
	•	Label:	Mass					
		Varname:	m_1_r_1					
		Comment:	Data Source 1					
		Expression:	m_1_ds_1[0] First Element)				
_			< Back Finish Cance	el				

- g. Click *Finish*. The Mass output response is displayed in the work area.
- 2. Create the Displacement output response.
 - a. From the **Directory**, drag-and-drop the plate.h3d file, located in approaches/nom_1/run_00001/m_1, into the work area.
 - b. In the File Assistant dialog, set the Reading technology to *Altair® HyperWorks®* and click *Next*.
 - c. Select *Single item in a time series*, then click *Next*.
 - d. Define the following options, and then click *Next*.
 - Set Subcase to Subcase 1 (Load).
 - Set Type to Displacement (Grids).
 - Set Request to N298.
 - Set Component to MAG.
 - e. Label the output response Displacement.
 - f. Set Expression to First Element.

🔮 File Assi	stant						
Create a Data Source and a Response							
Creating a new Data Source							
	Label: [Data Source 2					
Σ	Varname: r	n_1_ds_2					
🔽 Link	ed to a new Resp	onse					
	▲ Label:	Displacement					
کے ا	Varname:	m_1_r_2					
	Comment:	Data Source 2					
	Expression:	m_1_ds_2[0] First Element					
		< Back Finish Cancel					

g. Click *Finish*. The Displacement output response is added to the work area.

3. Click *Evaluate* to extract the output response values.

	Active	Label	Varname	Expression	Value	Comment
1	v	Mass	m_1_r_1	m_1_ds_1[0]	1.83e-06	Data Source 1
2	v	Displacement	m_1_r_2	m_1_ds_2[0]	0.0024906	Data Source 2

4. Proceed to the desired study type (DOE, Optimization, of Stochastic study).

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