Course in ANSYS

Example0505



calculations?

Objective:

Topics:

Tasks:

Element type, Real constants, modeling, plot results, output graphics

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t = 1 mmp = ?

Example - title



Example0505

Utility Menu > File /title, Plate		Enter:	Plate		
Change Title [/TITLE] Enter new title		•	×		
ОК	Cancel	Help			

Example – Areas Rectangle

Preprocessor > Modeling > Create > Areas > Rectangle > By Dimensions Create an area given by X=(0,200) and Y=(0,100)



Example – Areas Rectangle

1 AREAS	ANSYS FFR 22 2004
TYPE NUM	17:22:09
Y V	

Example – Element Type

Preprocessor > Element Type > Add/Edit/Delete



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Example - Element Type

Preprocessor > Element Type > Add/Edit/Delete

Ele	ment	t Types					×		
	Defir	ned Elemen	it Types:						
	туре	1	SHELL93						
							_		Press Options
		Add		Options	Del	ete			
		Clos	se		Help				

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Example - Element Type

Preprocessor > Element Type > Add/Edit/Delete

∧SHELL93 element type options	X		
Options for SHELL93, Element Type Ref. No. 1			
Element coord sys defined by K4	Elem orientation		
Extra stress output K5	No extra output 💽	Press Help to lea	rn more about the
Nonlin integration pt output K6	Exclude		
Store Mid data on rst file K8	NO		
OK Cancel	Help •		

Example – Real Constants

Preprocessor > Real Constants > Add



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Example - Real Constants

Preprocessor > Real Constants > Add

Real Constant Set Number 1.	for SHELL93		Real Constants	×
Element Type Reference No. 1			Defined Real Constant Sets	
Real Constant Set No.	þ		Set 1	1
Shell thickness at node I TK(I)	•			
at node J TK(J)	•			
at node K TK(K)	•			
at node L TK(L)	•			
Element X-axis rotation THETA				
Added mass/unit area ADMSUA				
		Enter 1		
• OK Apply Car	ncel Help			
			Add Edit Delete	
	Press Clos	е		
	to finish		Close Halp	
Press UK	L			

Example - Material Properties

Preprocessor > Material Props > Material Models



Example - Material Properties



Example0505

Example - Meshing

Preprocessor > Meshing > Size Cntrls > ManualSize > Lines > Picked Lines

Element Size on P
• Pick O Unpick
© Single C Box C Polygon C Circle C Loop
Count = 0 Maximum = 1 Minimum = 1 Line No. = © List of Items © Min, Max, Inc
OK Apply Reset Cancel Pick All Help

▲ Element Sizes on Picked Lines	×
[LESIZE] Element sizes on picked lines	
SIZE Element edge length	
NDIV No. of element divisions	•
(NDIV is used only if SIZE is blank or zero)	
KYNDIV SIZE,NDIV can be changed	🔽 Yes
SPACE Spacing ratio	
ANGSIZ Division arc (degrees)	
(use ANGSIZ only if number of divisions (NDIV) ar	nd
element edge length (SIZE) are blank or zero)	
Clear attached areas and volumes	No 🗖
OK Apply	Cancel Help
es OK when finish with sole	ection Enter 10 -
Example0505	13

Example - Meshing

Preprocessor > Meshing > Size Cntrls > ManualSize > Lines > Picked Lines

	Element Size on P
•	• Pick C Unpick
	© Single O Box O Polygon O Circle O Loop Count = 0
Select/Pick the two longest lines to specify	Maximum = 1 Minimum = 1 Line No. = • List of Items • Min, Max, Inc
mesh size for	OK • Apply
	Reset Cancel Pick All Help

Element Sizes on Picked Lines	×
[LESIZE] Element sizes on picked lines	
SIZE Element edge length	
NDIV No. of element divisions	•
(NDIV is used only if SIZE is blank or zero)	
KYNDIV SIZE,NDIV can be changed	
SPACE Spacing ratio	
ANGSIZ Division arc (degrees)	
(use ANGSIZ only if number of divisions (NDIV) and element edge length (SIZE) are blank or zero)	
Clear attached areas and volumes	
OK Apply Cancel	Help
ess OK when finish with selection	Enter 20 –
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Example - Meshing

Preprocessor > Meshing > Mesh > Areas > Mapped > 3 or 4 sided



Example - PlotCtrls Menu

Pan Zoom Rotate View Settings	Switch to On			
Numbering Symbols				
Style Font Controls Window Controls	Hidden Line Options Size and Shape Edge Options			
Erase Options	Contours Graphs			
Annotation •	Colors			
Device Options Redirect Plots Hard Copy	Translucency Texturing			
Save Plot Ctris Restore Plot Ctris Reset Plot Ctris	Background Multilegend Options Floating Point Format			
Capture Image Restore Image	Displacement Scaling Vector Arrow Scaling			
Write Metafile Multi-Plot Controls	Shell Normals Solid Model Facets Symmetry Expansion			
Multi-Window Layout				

∧Size and Shape	×
[/SHRINK] Shrink entities by	0 percent 🔽
[/ESHAPE] Display of element	□ Off
shapes based on real	
constant descriptions	
SCALE Real constant multiplier	0
[/EFACET] Facets/element edge	1 facet/edge
[/RATIO] Distortion of Geometry	
WN Window number	Window 1 🗨
RATOX X distortion ratio	1
RATOY Y distortion ratio	1
[/CFORMAT] Component/Parameter Format	
NFIRST, NLAST Widths	32 0
[/REPLOT] Replot upon OK/Apply?	Replot 🔹
	und la
Appiy Car	icei Heip

Example – Display of Element



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Example – Analysis Type Write Database Log File > Write DB log file Write Database Log to Directories: OK. Enter "example0505.lgw" c:\...\administrator *.lgw Cancel 🗁 c:\ 🗁 DOCUMENTS AN Help 👝 ADMINISTRATOL Cookies Dokumenter Foretrukne Solution > Analysis Type > New Analysis List Files of Type: Drives: Database Log (*.lgw) **C**: Network... • Ψ. New Analysis \times Write non-essential cmds as comments • [ANTYPE] Type of analysis Static C Modal C Harmonic O Transient C Spectrum C Eigen Buckling Press OK Substructuring OK (Cance Help

Example0505

Static solution – Analysis Options

ANSYS Main Menu	ANSYS Main Menu	۲		∧Static or Steady-State Analysis				×
📰 Preferences	🗐 Preferences			Nonlinear Options				
Preprocessor	Preprocessor			[NLGEOM] Large deform effects	□ off			
🗆 Solution	🗆 Solution							
Analysis Type	Analysis Type				Program chos	sen 🔽		
🔤 New Analysis	New Analysis			Adaptive descent	ON if necessa	ry 💌		
🔤 Restart	🔤 Restart			Linear Ontions				
Sol'n Controls	Sol'n Controls			[LUMPM] Use lumped mass approx?	E No			
Define Loads	ExpansionPass				1 140			
Load Step Opts	Analysis Options			[EQSLV] Equation solver	Program Chos	sen 🔻		
	Define Loads			Tolerance/Level -				
H FSI Set Up	🗄 Load Step Upts				1			
Imabridged Menu	H Physics			- valiu for all except Frontal and Sparse Solver	rs			
E General Postproc	E DODAN Cot Up			N. A. Jaho Itau	-	-		
E Timenist Postpro				Multiplier -	10			
E ROM Tool	ESI Set Un			- valid only for Precondition CG				
E Design Ont	Abridged Menu		-	[PRECISION] Single Precision -	C Off		-	
Proh Design	E General Postnroc			- valid only for Precondition CG		Select	restre	SS ON
E Radiation Opt	E TimeHist Postpro			[MSAVE] Memory Save -	□ Off		1	
🗉 Run-Time Stats	🗉 Topological Opt			- valid only for Precondition CG				
🔳 Session Editor	E ROM Tool							
🖬 Finish	🗄 Design Opt			[PIVCHECK] Pivots Check	🔽 On			
	🗄 Prob Design			 - valid only for Frontal. Sparse and PCG Solver 	rs			
	E Radiation Opt							
	🗄 Run-Time Stats			[SSTIF][PSTRES]				
	🔤 Session Ealtor			Stress stiffness or prestress	None	-		
				Note: If NLGEOM,ON then set SSTIF,ON.	None			
	1			[TOFFST] Temperature difference-	Prestress O			
	vata tha			- between absolute zero and zero of active temp	scale			
Una	bridaed menu			ок	Cancel		Help	
Cild								
				Example0505				19
								••

Example – Define Loads

Solution > Define Loads > Apply > Structural > Displacement > On Lines



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Example – Define Loads

Solution > Define Loads > Apply > Structural > Pressure > On lines



Example - Save



Display of Analysis model



Example - Solve

Solution > Solve > Current LS



Example - Finish



Eigen Buckling - New Analysis

Main Menu> Solution> Analysis Type> New Analysis



Eigen Buckling – Analysis Options

Main Menu> Solution> Analysis Type> Analysis Options



Example – Subspace Options

∧Subspace Eig	envalue Buckling	×		
[SUBOPT] Options for	Subspace Eigenvalue Buckling			
SUBSIZ Subspace wo	rking size	0		
NPAD No. of extra vectors		0		
NPERBK No of modes/memory block		0		
Strmck Sturm sequence check		At shift+end pts 🔹		
Number of subspace it	terations			
NUMSSI Maximum number		0		
NSHIFT Min, before shift		0		
ОК	Cancel	Help		
Press OK				

Eigen Buckling – Expanding Modes

Main Menu> Solution> Load Step Opts > ExpansionPass > Single Expand > Expand Modes

ANSYS Main Menu 🛞		
Preferences	▲ Expand Modes	×
Preprocessor	[MXPAND] Expand Modes	
Solution		
Analysis Type	NMODE No. of modes to expand	
🔤 Fast Sol'n Optn	EREOB EREOE Erequency range	
Define Loads	Thege, hege Thequency range	
Load Step Opts	Elcalc Calculate elem results?	
E Output Ctris		
Time (Frequenc	SIGNIF Significant Threshold	
I Noplinear	-only valid for SPRS and DDAM	0.001
ExpansionPass		0.001
Reset Options		
Read LS File	OK Cancel	Help
🔤 Write LS File		
Initial Stress		
Physics		
Solve		
FLOTRAN Set Up		Entor 2
Run FLOTRAN		
Abridged Menu		
Abridged Menu		
TimeHist Postpro		
Topological Opt		Shift to Yes to Calculate
ROM Tool		
🗄 Design Opt		element results
🗄 Prob Design		
🗄 Radiation Opt 🦳		
🗉 Run-Time Stats	Evennle0505	00
Session Editor		28
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Example - Solve

Solution > Solve > Current LS

Solve Current Load Step	Kj Note
[SOLVE] Begin Solution of Current Load Step	Solution is done!
Review the summary information in the lister window (entitled "/STATUS Command"), then press OK to start the solution.	i i
OK Cancel Help	Close
Press OK	

Example – Output Window

🗪 ANSYS 7.1 Output Window	<u>_ ×</u>			
*** FROM SUBSPACE ITERATION ***	▲			
SHAPE NUMBER LOAD MULTIPLIER				
1 0.74484375E-08 2 75.236064				
*** ELEMENT RESULT CALCULATION TIMES Type number ename total CP ave CP				
1 200 SHELL93 0.110 0.000551				
*** NODAL LOAD CALCULATION TIMES TYPE NUMBER ENAME TOTAL CP AVE CP				
1 200 SHELL93 0.010 0.000050				
*** NOTE *** CP= 24.125 Solution is done!	TIME= 18:04			
*** PROBLEM STATISTICS ACTUAL NO. OF ACTIVE DEGREES OF FREEDOM = 3846 R.M.S. WAVEFRONT SIZE = 147.3				
*** ANSYS BINARY FILE STATISTICS BUFFER SIZE USED= 16384 5.625 MB WRITTEN ON ELEMENT MATRIX FILE: file.emat 0.500 MB WRITTEN ON ELEMENT SAUED DATA FILE: file. 1.375 MB WRITTEN ON ASSEMBLED MATRIX FILE: file.fu 0.125 MB WRITTEN ON MODAL MATRIX FILE: file.mode 1.125 MB WRITTEN ON RESULTS FILE: file.rst	t .esav ull			
▲				

Example - Finish



Example – Results Summary

ANSYS Main Menu		
🛅 Preferences		
Preprocessor		
🗆 General Postpro		
🔤 Data & File Up	pts	
Results Summ	mary	
E Read Results	S .	
	SET LIST Command	X
I list Result Eil		
E Overv Res		
Ontions fc		
Results Vi *	***** INDEX OF DATA SETS ON RESULTS FILE ****	
Write PGR		
🗉 Nodal Calc	1 0.74484E-08 1 1 1	
🗄 Element T	2 75.236 1 2 2	
🗉 Path Oper		
🗄 Load Case		
Check Eler		
🔤 Write Res		
ROM Oper		
Submodel		
H Fatigue		
E Salety Fat		
TimeHist Pos		
E Topological (
ROM Tool		
🗉 Design Opt		
🗉 Prob Design 🦾		
🗉 Radiation Opt		
⊞ Run-Time Stats	S S	
🔟 Session Editor	•	
4		
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Example – Read Results



Example – First set

As there are no constraints on rotation about the Z-axis an extra buckling mode of simple rotation at a load of approximately zero

Example – Next set



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Example – Contour Plot



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