Rubber bumper



v sty 2020 – MARC/Mentat 2018

0. Analysis planar (PLN)

1. Geometry & Mesh

- 1.1 Geometry & Mesh: Length: Inch
- 1.2 File: Import: IGES ...: "geo.igs"
- 1.3 Automesh: Planar
 - a) Divisions: 35 35
 - b) Quad Mesh!
 - Select rubber curves
 - All Selected
 - c) Ok

2. Boundary Conditions

- 2.1 New (Structural): Fixed Displacement
 - a) Displacement X: 0
 - b) Displacement Y: 0
 - c) Curves Add
 - Select left rubber curve
 - All Selected
 - d) Ok

3. Material Properties

3.1 New: Finite Stiffness Region: Standard nazwa: Guma

- a) Mass Density: 1
- b) Type: Mooney
- c) C10: 0.84
- d) C01: 0.21
- e) Elements Add
 - All Existing
- f) Ok

4. Geometric Properties

4.1 New (Structural): Planar: Plane Strain

- a)Thickness: 3
- b) Elements Add
 - All Existing
- c) Ok

5. Contact

- 5.1 New: Meshed (Deformable) nazwa:Odbojnik
 - a) Elements Add
 - All Existing
 - b) Ok
- 5.2 New: Geometric nazwa:Burta
 - a) Body Control: Velocity
 - b) Parameters
 - Velocity X: -2
 - Approach Velocity X: -1







х	-2	Table
Ŷ	0	Table
Z	0	Table
Rotational (Rad/Time)	0	Table
Approach	Nelocity	
x	-1	
Y Y	0	
X Y Z	0	

- Ok

c) 2-D: Curves Add

- Select steel curves
- All Selected

d) Ok

5.3 Contact Tables: New *nazwa: kontakt1*

a) Full Default Contact: Touching

b) 2: T

- Contact Interaction - Edit

- Friction



Friction Parameters

0.2

OK

Loadcase Properties

1e+020

🔲 Inertia Relief

Termination Criteria

Steps 50

Table

Table

×

×

- Friction Coefficient: 0.2

M

M

Name

Type

Loads

Contact

Total Loadcase Time

Adaptive O Multi-Criteria O Arc Length

Fixed

Name interact2

Eriction Coefficient

Friction Stress Limit

Anisotropic Friction

lcase1

static

Structural

Solution Control

Convergence Testing Numerical Preferences

Constant Time Step

O Temperature

4

Stepping Procedure

0.08

Type Meshed (Deformable) Geometric

- Ok

- Ok

- Ok

c) Ok

5.4 Contact Bodies: Identify

If lines points to rubber bumper:

- 5.5 Tools: Flip Curves
 - a) Select curve
 - b) All Selected

6. Loadcases

6.1 New: Static nazwa:jazda

a) Contact

- Contact Table

- kontakt1

- Ok

b) Total Loadcase Time: 4

c) # Steps: 50

d) Ok

<u>7. Jobs</u>

7.1 New: Structural

- a) Available: *jazda*
- b) Analysis Options
 - Inverse Power Sweep
 - Ok
- c) Contact Control
 - Type: Arctangent (Coulomb)
 - Relative Velocity Threshold: 0.05



- Initial Contact

- Conta	act Table
	- kontakt1
	- Ok
- Ok	

d) Job Results

- Available Element Tensor: Cauchy Stress
- Available Element Tensor: Total Strain
- Available Element Scalar: Equivalent Cauchy Stress
- Available Element Scalar: Equivalent Elastic Strain

- Ok

e) Ok

7.2 Element Types

a) Solid

- 80
- All Existing
- Ok

b) Ok

7.3 Jobs: Properties

- a) Run
- Submit (1)
- Monitor
- Ok
- b) Ok

8. Results

- 8.1 File: Open Default
- 8.2 Model Plot
 - a) Scalar: Equivalent of Cauchy Stress
 - b) Style: Contour Bands
 - c) Skip to Inc: 50



m		Contact Contro	
Name	job1		
Туре	Structural		
Meth	od	Node To Segme	nt
		Friction	
Тур	e	Coulomb Arctan	gent (Velocity)
Nur	nerical Model	🔘 Bilinear (Displa	cement)
		Arctangent (Version)	elocity)
		O Stick-Slip	
Met	hod	O Nodal Stress Parameters	Nodal Force
R	elative Velocit	y Threshold	0.05
Ir	nitial Contact		
	Advanced (Contact Control	
		OK	

Vame	job 1	job 1						
Гуре	Stru	Structural						
	User S	Subroutine	File					
Parallelization/GPU			J	No DDM	1			
				1 Assembly/Recovery Thread				
				1 Solver Thread				
				No GPL	I(s)			
Title	e l	Style	Tabl	e-Driven	-	S	ave Model	
5	Submit	ubmit (1) Advanced				Job Submission		
Update			1	Monitor		Kill		
Statu	s				Com	plete		
Current Increment (Cycle) Singularity Ratio Convergence Ratio Analysis Time Wall Time				50 (50 (6)			
				0.18	0.18401			
				0.09	0.09111			
				4	4			
					17	17		
				Total				
Cycles 210 Separations 42		210	C	ut Backs	acks 6			
		12	R	meshes 0				
Exit Number		30	04	E	Exit Message			
Edit	Output File		- E	Cile	Status	Status File Any		

Run Job

М

Inc: 50



Equivalent of Total Strain

8.3 History Plot

- a) All Incs
- b) Add Curves
 - X-Axis > Data Carrier Type Contact Body
 - Contact Body cbody2
 - Variable Pos X
 - Y-Axis >Data Carrier type Contact Body
 - Contact Body cbody2
 - Variable Force X







Powtórzyć analizę z WYŁĄCZENIEM tarcia:

- 1. Zamknąć plik wyników I wrócić do modelu
- 2. W drzewie ustawień kliknąć podwójnie w Jobs "jobs1" (wchodzimy do edycji)
- 3. W ContactControl odznaczamy opcję Friction (zob. 7.1.c)
- 4. uruchamiany analizę jak w p. 7.3 (czyli kliknąć podwójnie w Jobs "jobs1" i RUN)
- 5. Porównujemy wyniki z punktem 8.



Max: 6.335e-01 @Node 599