

User Manual

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This is a test version and may have bugs.

Step 1

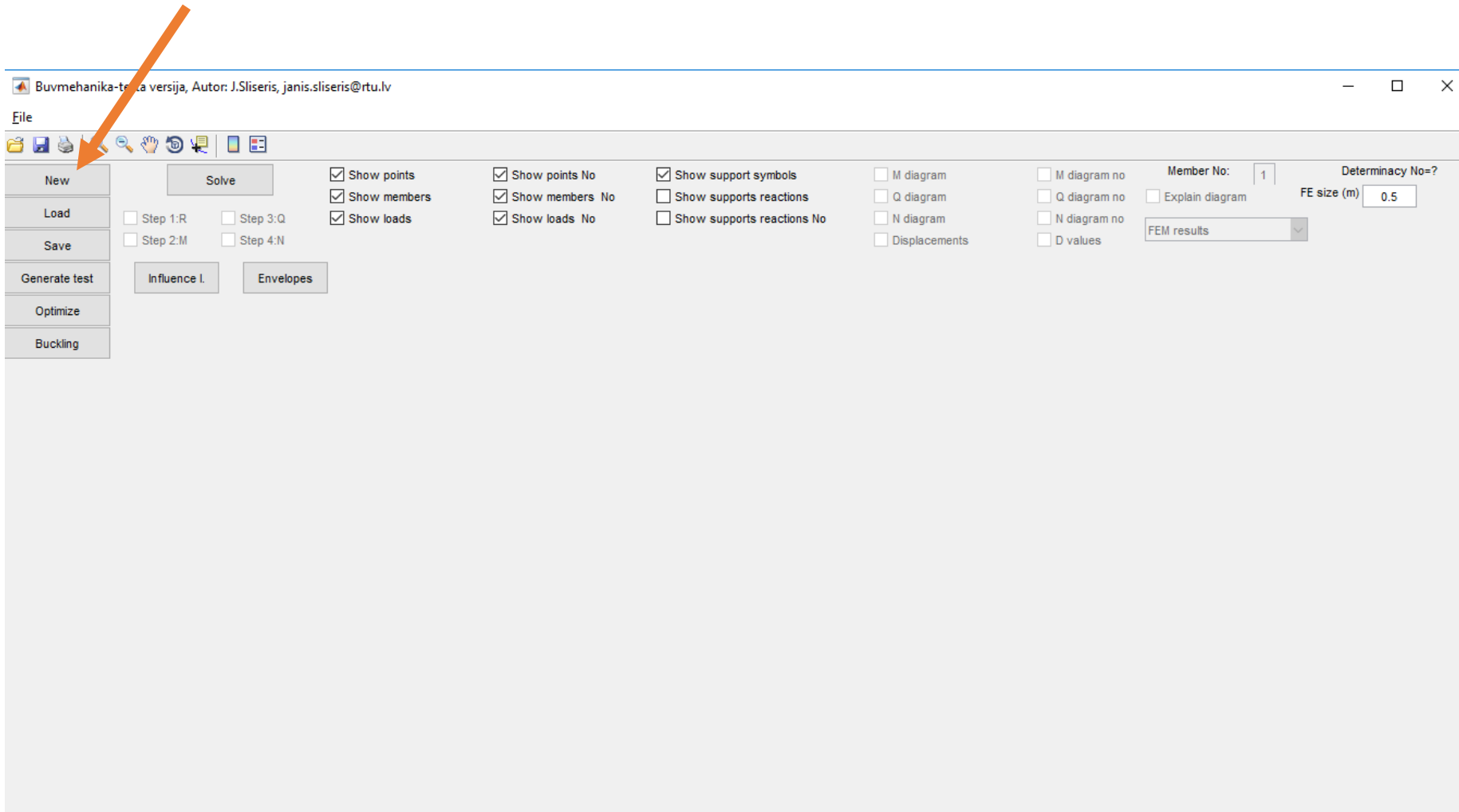
Install Software

Minimal requirements:

64 bit Windows.

It is compiled and tested on 64 bit Windows 10.

Step 2: Open software (SW) and press «New»



Step 3: Choose the structure

If the deflection calculation is necessary then cross section parameters and modulus of elasticity E should be specified

The screenshot shows a window titled "New random structure" with a menu bar containing "File" and a toolbar with various icons. The main area contains several buttons for structure types: "Single span beam", "Multi-span beam", "Frame", "Undetermined beam n=1", "Undetermined beam n=2", "Undetermined frame n=1", and "Undetermined frame n=2". To the right of these buttons are input fields for "Mom. of inertia I (m^4) =", "Cross sect. Area (m^2) =", and "Young mod. E (KPA) =", with values $1943 \cdot 10^{-8}$, $28.5 \cdot 10^{-4}$, and 10^6 respectively. A "Browse" button is next to a text box containing the path `C:\Users\janis\matlab_codes\platform\Students_ver`. Below this is a "Show_random_struct" button and a file list table.

Select	filename	Probability
<input type="checkbox"/>	filename.rstruct	1

At the bottom right, there is a "Use *.rstruct file" button.

Step 4: Calculate the structure by pressing «Solve»

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File

New **Solve** Show points Show points No Show support symbols M diagram M diagram no Explain diagram FE size (m)

Load Step 1:R Step 3:Q Show members Show members No Show supports reactions Q diagram Q diagram no

Save Step 2:M Step 4:N Show loads Show loads No Show supports reactions No N diagram N diagram no

Generate test **Influence I.** **Envelopes** Displacements D values Member No:

Optimize

Buckling

The diagram shows a horizontal beam with a coordinate system where the origin (0) is at the first support. The beam is divided into four segments: Segment 1 (0 to 9 m) with a uniformly distributed load of 4 kN/m; Segment 2 (9 to 11 m) with a point load of 9 kN at the end; Segment 3 (11 to 23 m) with no load; Segment 4 (23 to 27 m) with a uniformly distributed load of 3 kN/m. A point load of 22 kN is applied at the end of the beam (27 m). The beam is supported by three roller supports at x=0, x=9, and x=23 m.

Step 5: Look on results

Analytical solution results

Diagrams for M, Q, N and deformed shape D

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File

New Solve Show points Show points No Show support symbols

Load Step 1:R Step 3:Q Show mem... Show member... Show supports reactions

Save Step 2:M Step 4:N Show loads Show loads No Show supports reactions...

Generate test Influence I. Envelopes

Optimize

Buckling

M diagram M diagram no Explain diagram

Q diagram Q diagram no

N diagram N diagram no

Displacements D values

Member No: 1 Determinacy no=0

FE size (m) 0.5

FEM results

No.	
1.	Calculate support reactions
1.1.	Write equilibrium equation on horizontal axis
1.2.	Write equilibrium equation on horizontal axis
1.3.	Write moment equilibrium equation $\sum M=0$
1.4.	Moment equations in hinges
1.5.	Reactions: System of equations
1.6.	Reactions: Results
1.7.	Calculate M, Q, N diagrams
1.7.1.	M diagram
1.7.2.	Q diagram
1.7.3.	N diagram

Coordinate, m

Coordinate, m

Step 5.1: Look on results and compare with own calculations (some small differences <5% my be)

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File

Show points Show points No Show support symbols M diagram M diagram no Member No: 1 Determinacy no=0
 Show mem... Show member... Show supports reactions Q diagram Q diagram no Explain diagra FE size (m) 0.5
 Show loads Show loads No Show supports reactions... N diagram N diagram no FEM results
 Step 1:R Step 3:Q Displacements D values

Step 2:M Step 4:N
 Influence I. Envelopes

New Solve
 Load Save
 Generate test Optimize
 Buckling

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1.7.3.	N diagram

Coordinate, m

Coordinate, m

0 9 11 23 27
 $U_x=0$ $U_y=0$ $Rot_z=0.02404$ $U_x=0$ $U_y=0$ $Rot_z=0.02441$ $U_x=0$ $U_y=0$ $Rot_z=0.01015$ $U_x=0$ $U_y=-0.5853$ $Rot_z=-0.1627$

Step 6: Calculate influence lines

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File

Show points Show points No Show support symbols M diagram M diagram no Member No: 1 Determinacy no=0
 Show mem... Show member... Show supports reactions Q diagram Q diagram no Explain diagram FE size (m) 0.5
 Show loads Show loads No Show supports reactions... N diagram N diagram no
 Step 1:R Step 3:Q Displacements D values FEM results

Step 2:M Step 4:N

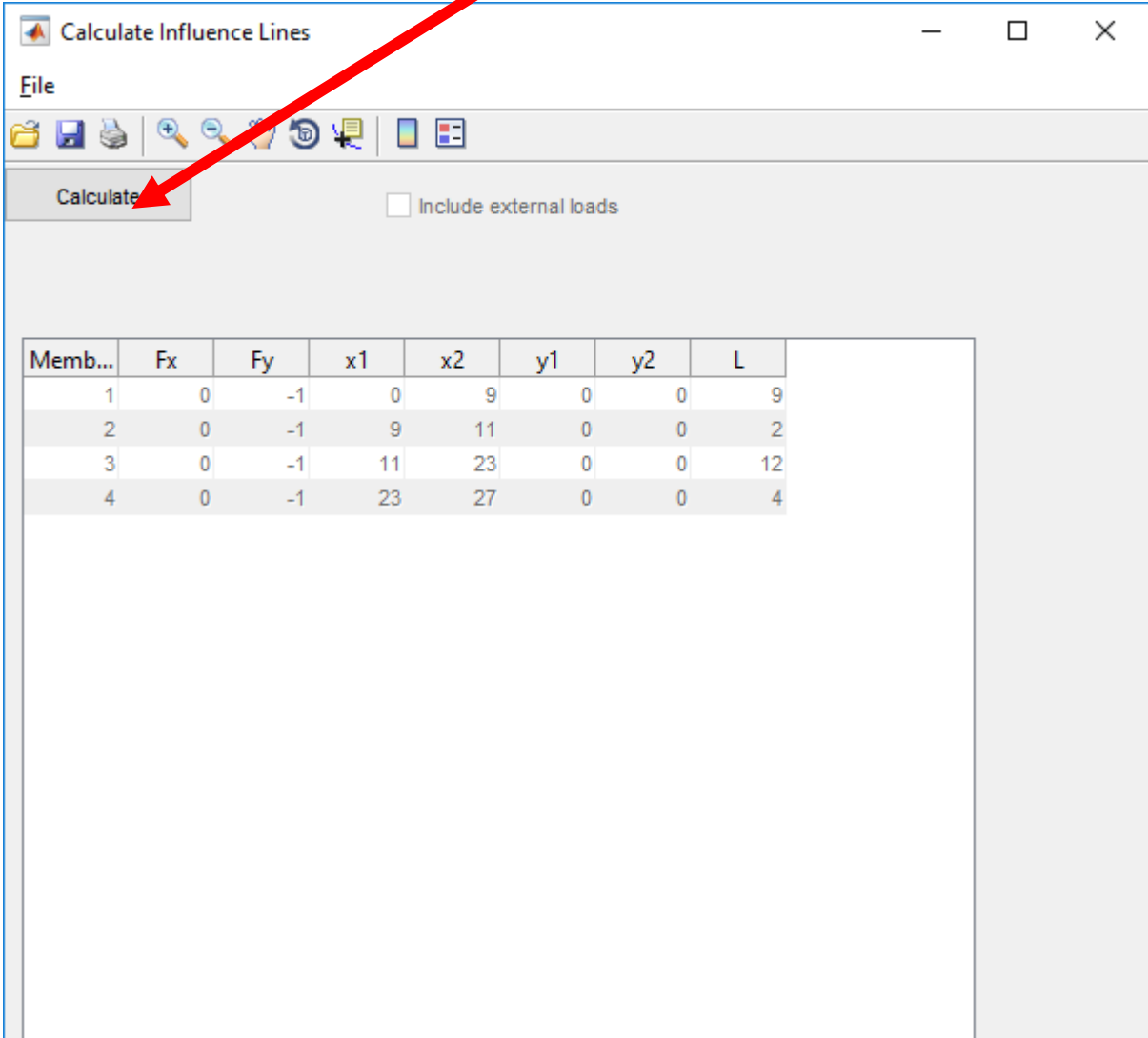
No.	
1.	Calculate support reactions
1.1.	Write equilibrium equation on horizontal axis
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Coordinate, m

Coordinate, m

$U_x=0$ $U_y=0$ $Rot_z=0.02184$ $U_x=0$ $U_y=0$ $Rot_z=0.02441$ $U_x=0$ $U_y=0$ $Rot_z=0.01015$ $U_x=0$ $U_y=-0.5853$ $Rot_z=-0.1627$

Step 6.1: Calculate values of influence lines



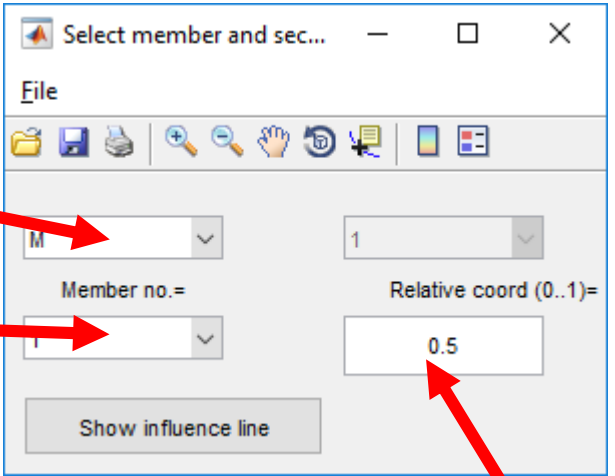
Calculate Include external loads

Memb...	Fx	Fy	x1	x2	y1	y2	L
1	0	-1	0	9	0	0	9
2	0	-1	9	11	0	0	2
3	0	-1	11	23	0	0	12
4	0	-1	23	27	0	0	4

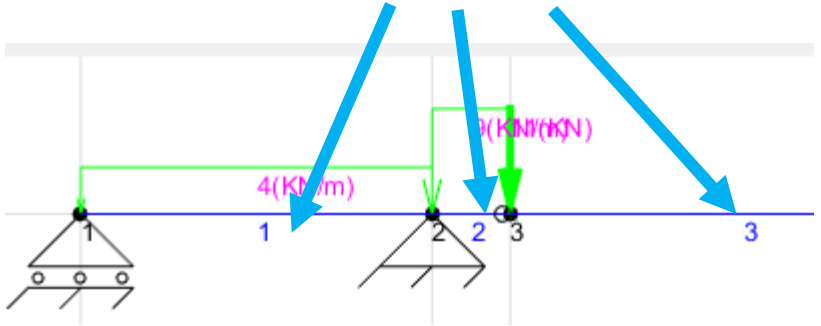
Step 6.2: Choose necessary section where to show influence lines. Choose M or Q.

M- Influence line for bending moment, Q- for shear force

Specify the number of bar

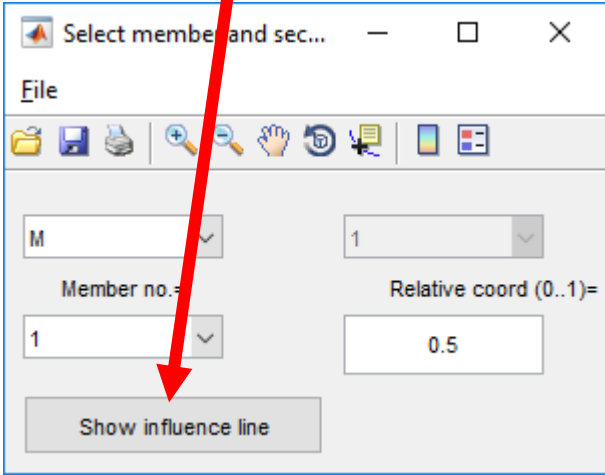


Bar numbers: 1,2,3



Relative coordinate on bar- 0- beginning of bar, 0.5- middle, 1- end of bar

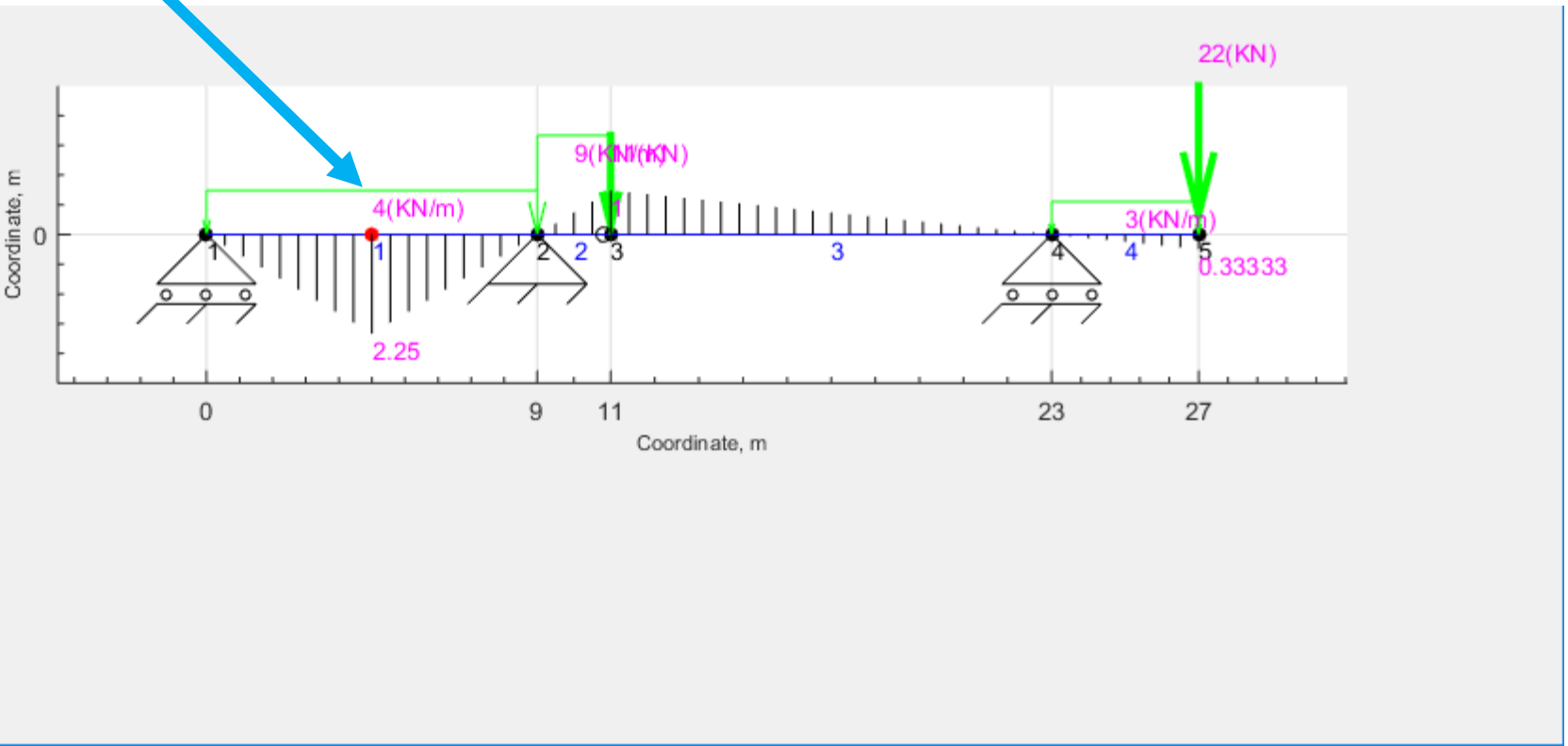
Step 6.3: Show the influence lines



Step 6.4: Compare results with own calculations

Red dot indicate the point for which influence line is calculated

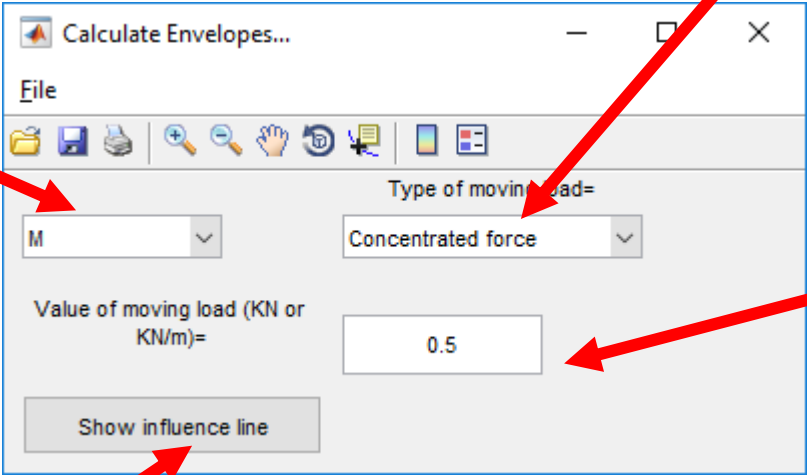
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Ste 7: Calcualte envelopes

Type of envelope (M-
moment, Q- shear
force)

Type of moving load



Value of moving load

Nospiežam pogu lai
aprēķinātu

Step 7.1: Analyse and compare the results

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File

New Load Save Generate test Optimize Buckling

 Show points Show points No Show support symbols M diagram M diagram no Member No: 1 Determinacy no=0

Step 1:R Step 3:Q Show mem... Show member... Show supports reactions Q diagram Q diagram no Explain diagra FE size (m) 0.5

Step 2:M Step 4:N Show loads Show loads No Show supports reactions... N diagram N diagram no FEM results

Displacements D values

No.	
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1.1.	Write equilibrium equation on horizontal axis s
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Coordinate, m

Coordinate, m

0 9 11 23 27

4 (kN/m) 9 (kN) 22 (kN) 3 (kN/m)

-1.7e-13 -157 -1.56e-14 -190 -17.6 -1.99e-11

If student has found an error in software
behavior please write and e-mail:
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