



Structural Analysis & Design Software

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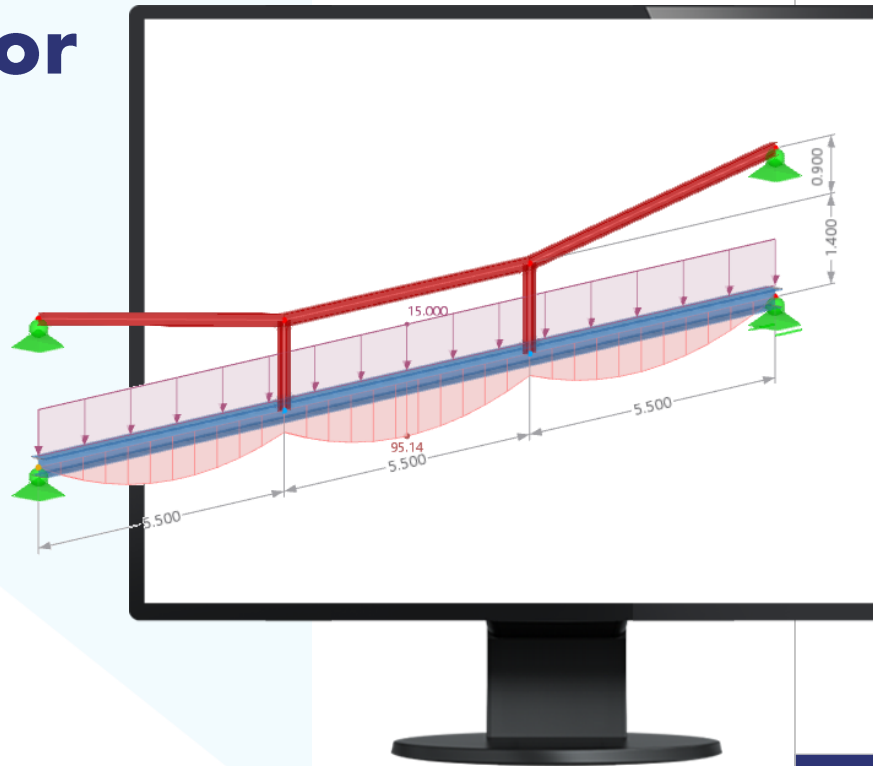
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Introduction to Member Design

RFEM 6 for Students



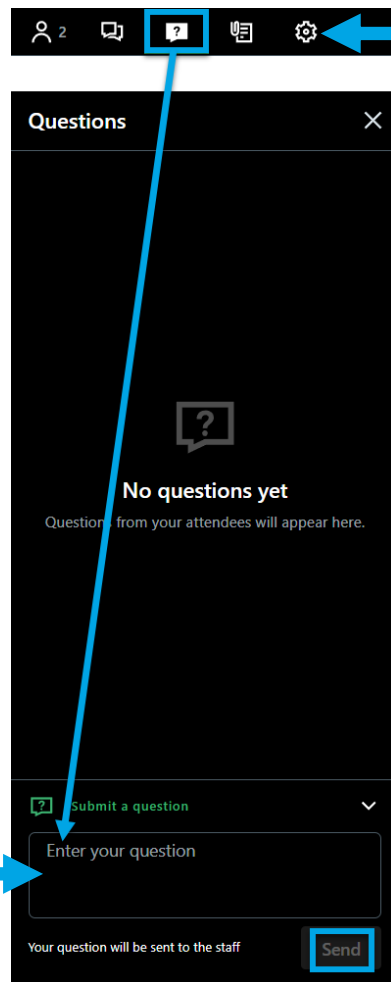
Questions During the Presentation



GoToWebinar Control Panel
Desktop



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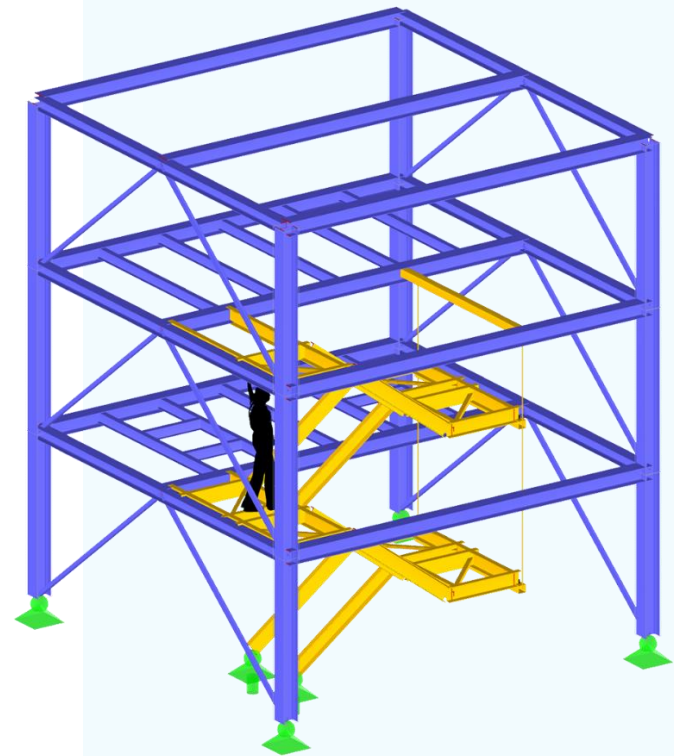
Adjust audio settings

Ask questions



CONTENT

- 01 Introduction to RFEM user-interface
- 02 Introductory example: Single-span beam
- 03 Advanced analysis examples
- 04 Influence of 2nd order theory
- 05 Linear bifurcation / Stability analysis





User-Interface

Menubar

Search function

Navigator

Toolbar top side

Viewcube

Workspace

AI-Assistent

Table

Toolbar bottom side

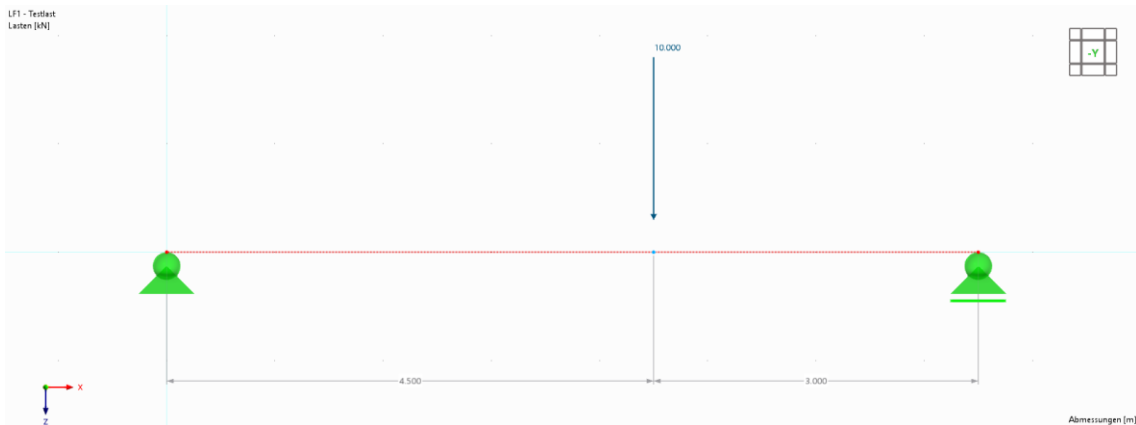
The screenshot shows the RFEM software interface with the following components labeled:

- Menubar:** Located at the top of the window, containing menus like 'Datei', 'Bearbeiten', 'Ansicht', etc.
- Search function:** A search bar located in the top right corner of the software window.
- Navigator:** A tree view on the left side of the interface, showing the project structure.
- Toolbar top side:** A horizontal toolbar located above the main workspace.
- Viewcube:** A 3D cube icon in the top right corner of the workspace, used for changing the view orientation.
- Workspace:** The central 3D area where the model is displayed.
- AI-Assistent:** A small circular icon in the bottom right corner of the workspace, representing the AI assistant.
- Table:** A table at the bottom of the interface, titled 'Materialien', listing material properties.
- Toolbar bottom side:** A horizontal toolbar located below the table.

Material Nr.	Name des Materials	Material-typ	Materialmodell	Elastizitätsmodul E [N/mm ²]	Schubmodul G [N/mm ²]	Querdehnzahl ν [-]	Spez. Gewicht γ [kN/m ³]	Dichte ρ [kg/m ³]	Wärmedehnzahl α [1/°C]	Optionen	Kommentar
1											
2											
3											
4											
5											
6											
7											



Single-span beam with concentrated load



Step by Step

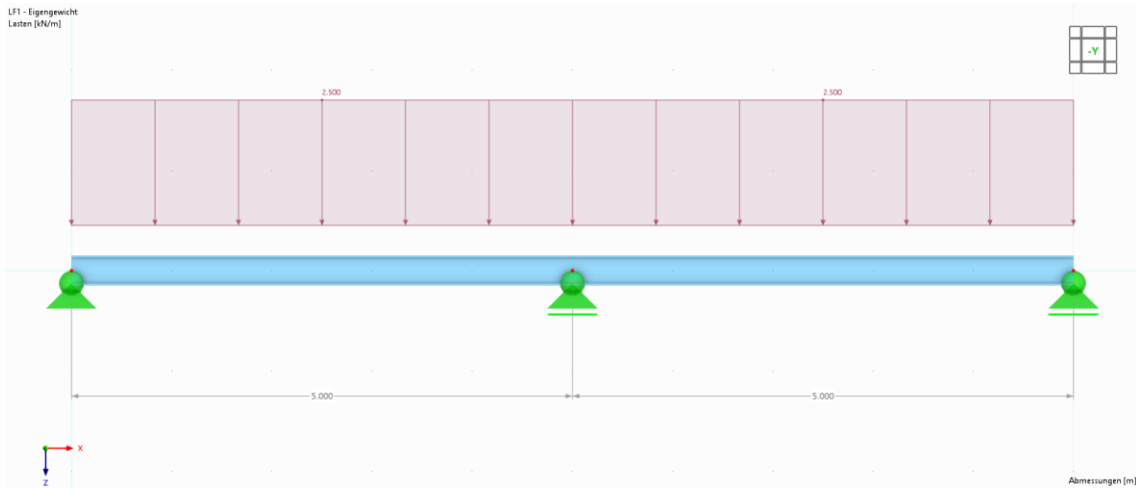
- Modeling
- Loadcases and Loads
- Calculation
- Results

Result interpretation

- Support Reaction
- Internal Forces
- Deformation



Two-span beam with altering load position



Information

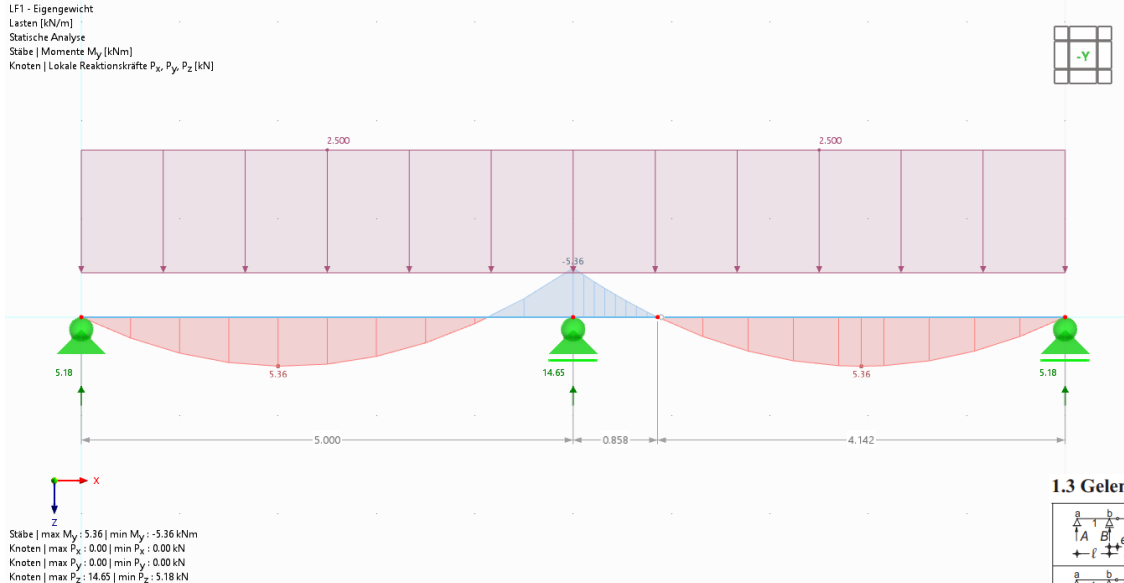
- HEB 300, S235
- LC 1: Self-weight | $g = 2,5 \text{ kN/m}$
- LC 2: Imposed load left | $q = 5,0 \text{ kN/m}$
- LC 3: Imposed load right | $q = 5,0 \text{ kN/m}$

Tasks

- Determine the support forces, internal forces and deformations
- Determine the governing load combination that causes the largest internal forces



Gerber beam / Hinged beam



Information

- Schneider Bautabellen (24. Edition): page 4.13
- Eccentricity e : $0,1716 \times L$

Tasks

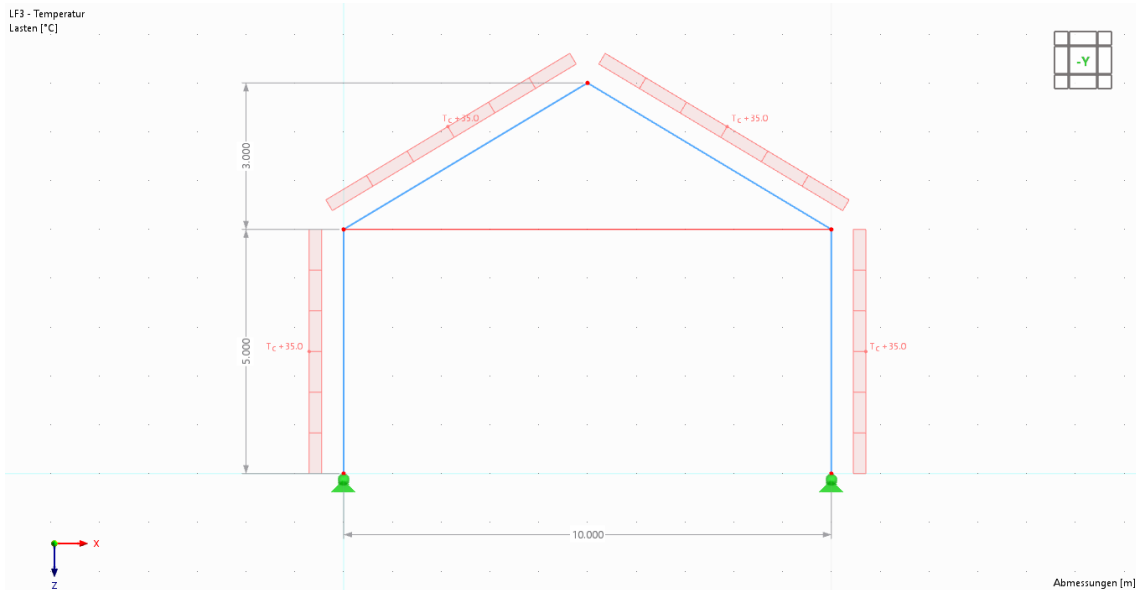
- Parametrize the structure

1.3 Gelenkträger (Gerberträger)¹⁾ mit Streckenlast q

	$e = 0,1716 l$	$A = 0,414 ql$ $B = 1,172 ql$	$M_1 = 0,0858 ql^2$ $M_2 = 0,0858 ql^2$ $M_3 = -0,0858 ql^2$	$f_1 = \frac{ql^4}{130 EI}$
	$e = 0,22 l$	$A = 0,414 ql$ $B = 1,086 ql$	$M_1 = 0,0858 ql^2$ $M_2 = 0,0392 ql^2$ $M_3 = -0,0858 ql^2$	$f_1 = \frac{ql^4}{130 EI}$
	$e = 0,1250 l$	$A = 0,438 ql$ $B = 1,063 ql$	$M_1 = 0,0957 ql^2$ $M_2 = 0,0625 ql^2$ $M_3 = -0,0625 ql^2$	$f_1 = \frac{ql^4}{130 EI}$
	$e = 0,1716 l$	$A = 0,414 ql$ $B = 1,086 ql$	$M_1 = 0,0858 ql^2$ $M_2 = 0,0392 ql^2$ $M_3 = -0,0858 ql^2$	$f_1 = \frac{ql^4}{130 EI}$



Two-hinged frame with tie rod



Information

- Frame: HEB 300, S235
- Tie rod: R30
- LC 1: Snow | $s = 1,0 \text{ kN/m}$
- LC 2: Wind | $w = 1,0 \text{ kN/m}$
- LC 3: Temperature increase of the frame
 $T_c = 35 \text{ K}$

Tasks

- Determine the support forces, internal forces and deformations

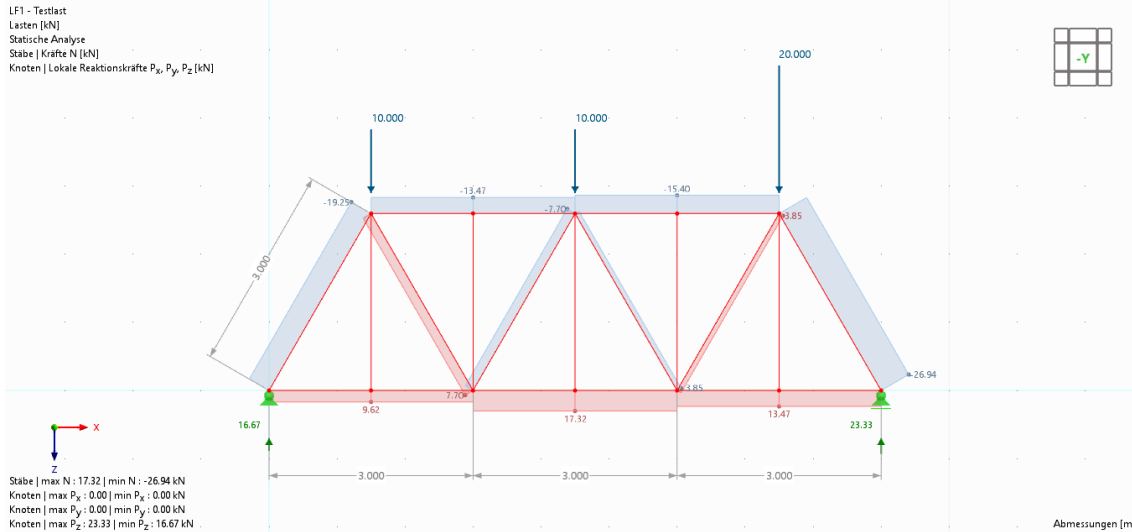
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Coffee Break





Ideal truss structure



Information

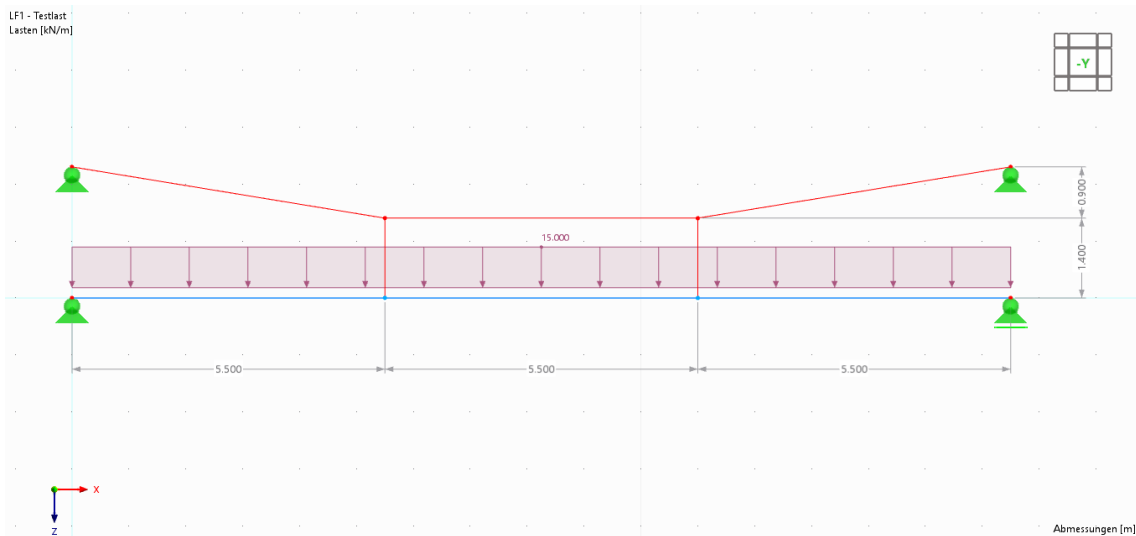
- Members: HEB 300, S235
- Nodal loads as indicated
- Member Type: Truss (only N)

Tasks

- Determine the support forces and internal forces
- Determine the null members
- Which members are loaded in tension / compression?



Suspended single-span beam



Information

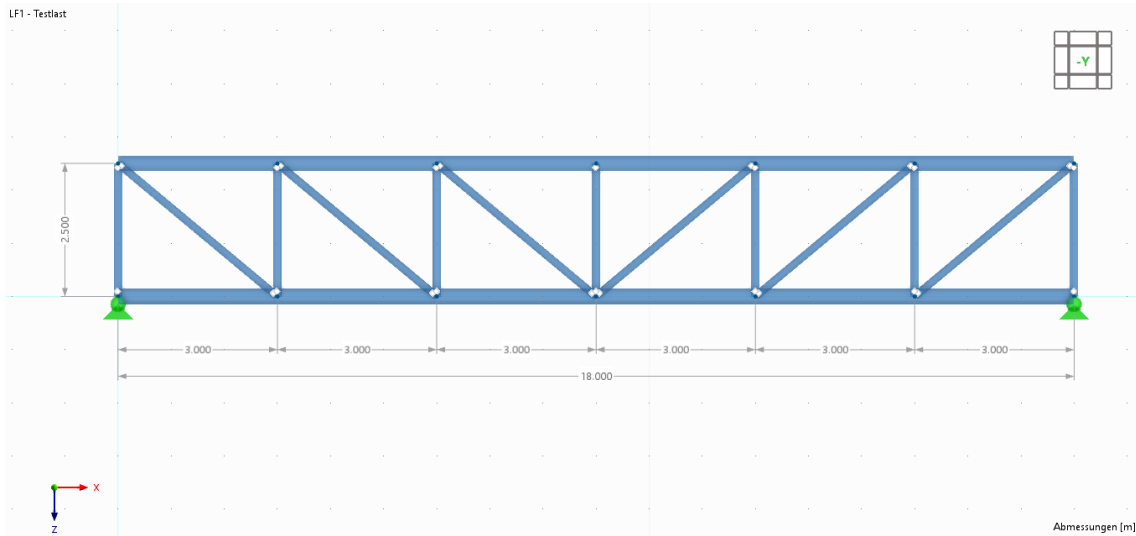
- Truss members: IPE 200, S235
- Beam: HEB 300, S235
- Distributed load: $q = 15 \text{ kN/m}$

Tasks

- Determine the support forces and internal forces



Generated truss structure



Information

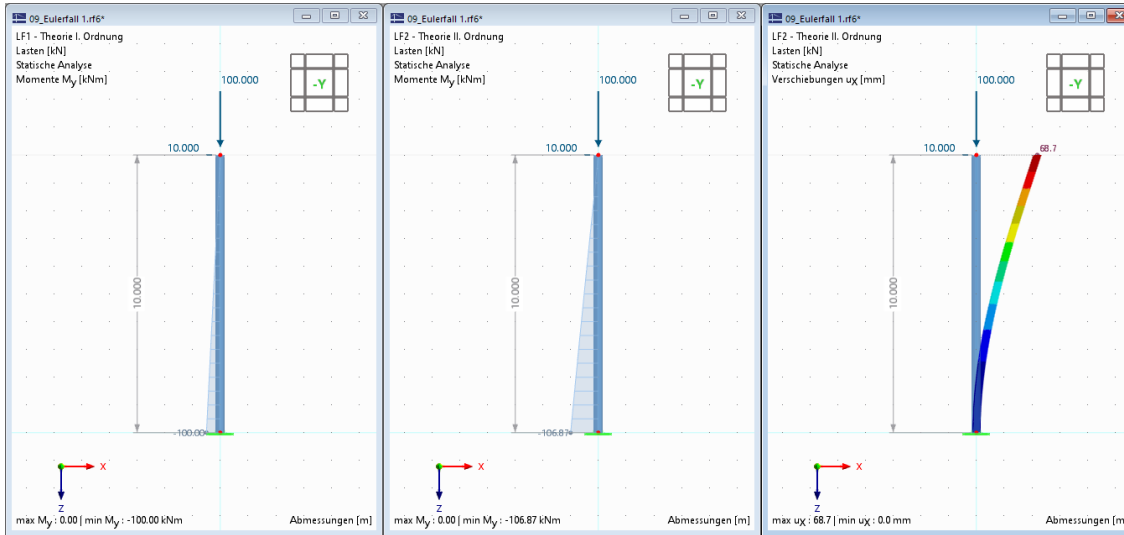
- Upper/lower Chord: HEA 300, S235
- Diagonals: IPE 160, S235
- Posts: HEA 160, S235

Tasks

- Get familiar with blocks
- Replace the beam members with regular truss members



Fixed column | 1st and 2nd order theory



Information

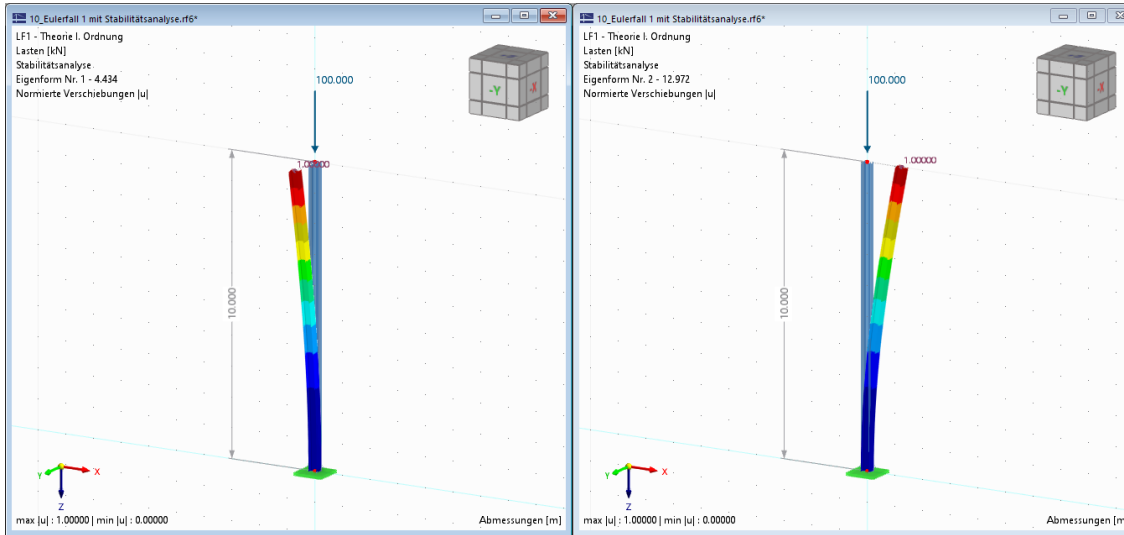
- Fixed column: HEB 300, S235
- Nodal load: $P_z = 100$ kN, $P_x = 10$ kN

Tasks

- Study the influence of 2nd order theory on the resulting internal forces and deformations



Euler-Case 1 | Mode shapes



Information

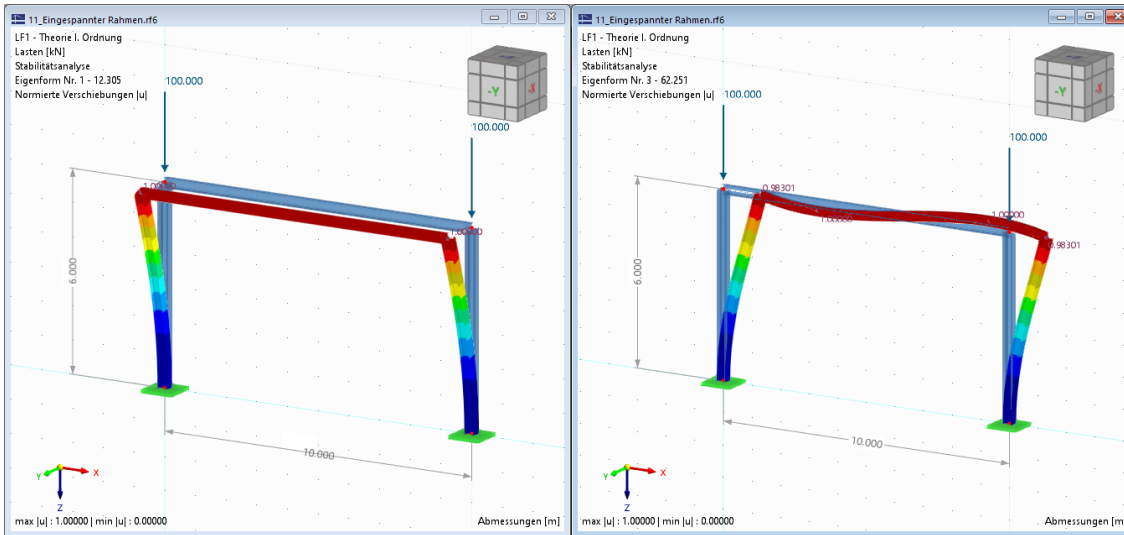
- Fixed column: HEB 300, S235
- Load: $P_z = 100$ kN
- Add-on: Structure Stability

Tasks

- Calculate the critical load of a cantilever
- Determine the critical lengths for buckling about the minor and major axis of the cross-section



Fixed frame | Mode shapes



Information

- Columns: HEB 300, S235
- Beam: IPE 300, S235
- Add-on: Structure Stability required

Aufgaben

- Compare the different mode shapes
- How to prevent the frame from buckling out-of-plane?

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