Verification Example

Program: RFEM 5

Category: Geometrically Linear Analysis, Isotropic Linear Elasticity, Constraints, Member, Plate

Verification Example: 0038 – Diaphragm Constraint

0038 – Diaphragm Constraint

Description

This example serves as a demonstration of the diaphragm constraint. The application is shown on the two-storeyed structure. The structure is loaded by means of lateral forces according to the **Figure 1**.

Material	Concrete	Modulus of Elasticity	E	34300.000	MPa
		Poisson's Ratio	ν	0.200	–
Geometry	Structure	Column Height	h	3.000	m
		Width	w	7.000	m
		Depth	d	5.000	m
		Floor thickness	t	0.200	m
	Column Cross-section	Width	a	0.200	m
Load		Force	F_x	2.000	kN

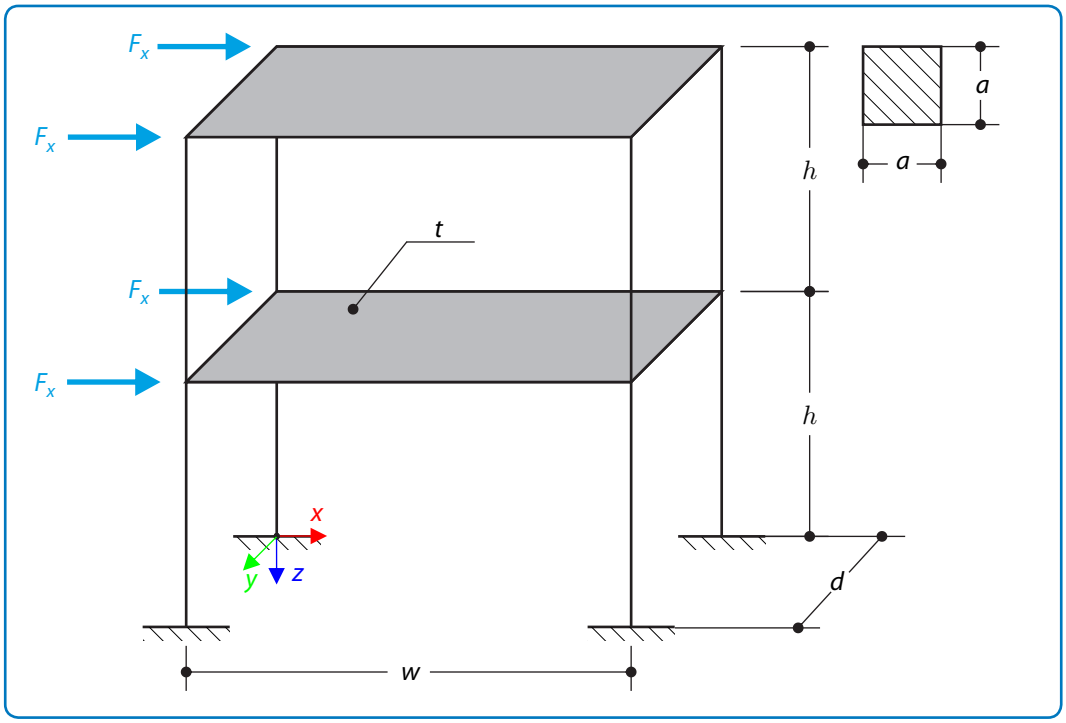

Figure 1: Problem sketch

Determine the maximum deflection of the structure u_x in the direction of loading forces using both the diaphragm constraint and the plate model of the floor.

Analytical Solution

Analytical solution is not available for this example.

RFEM 5 Settings

- Modeled in RFEM 5.05.0030
- The global element size is $l_{FE} = 0.500$ m
- Geometrically linear analysis is considered
- The number of increments is 5
- Horizontal beams and plates are coupled with the columns by means of hinges

Results

Structure Files	Program	Floor Model
0038.01	RFEM 5	Diaphragm Constraint
0038.02	RFEM 5	Plate Model

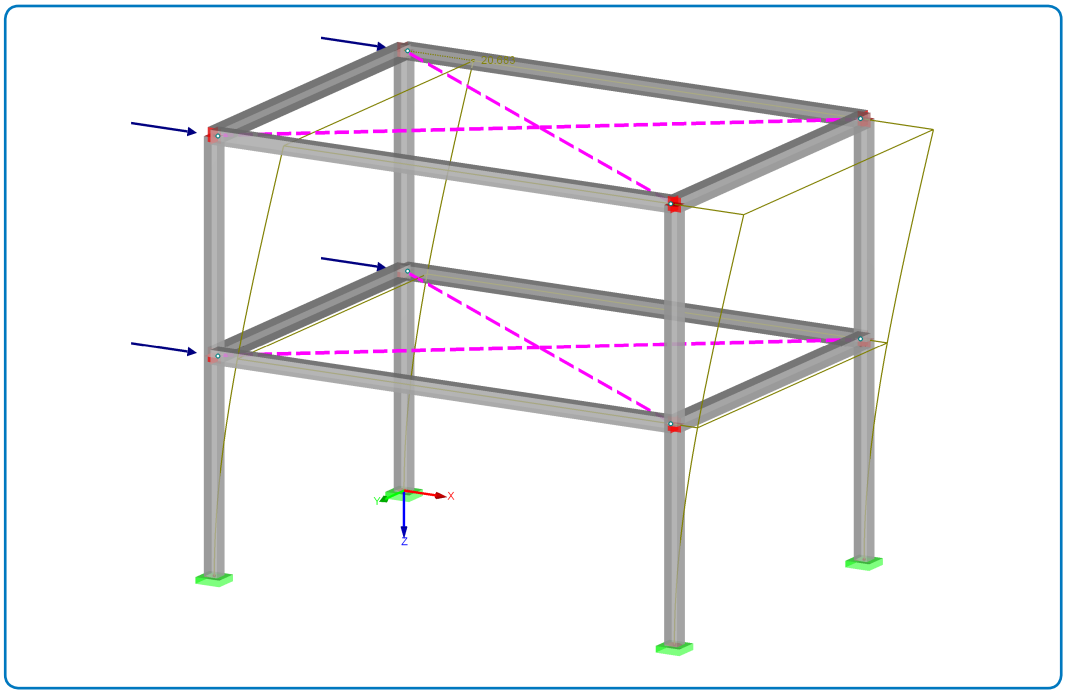

Figure 2: Structure modeled by means of the diaphragm constraints

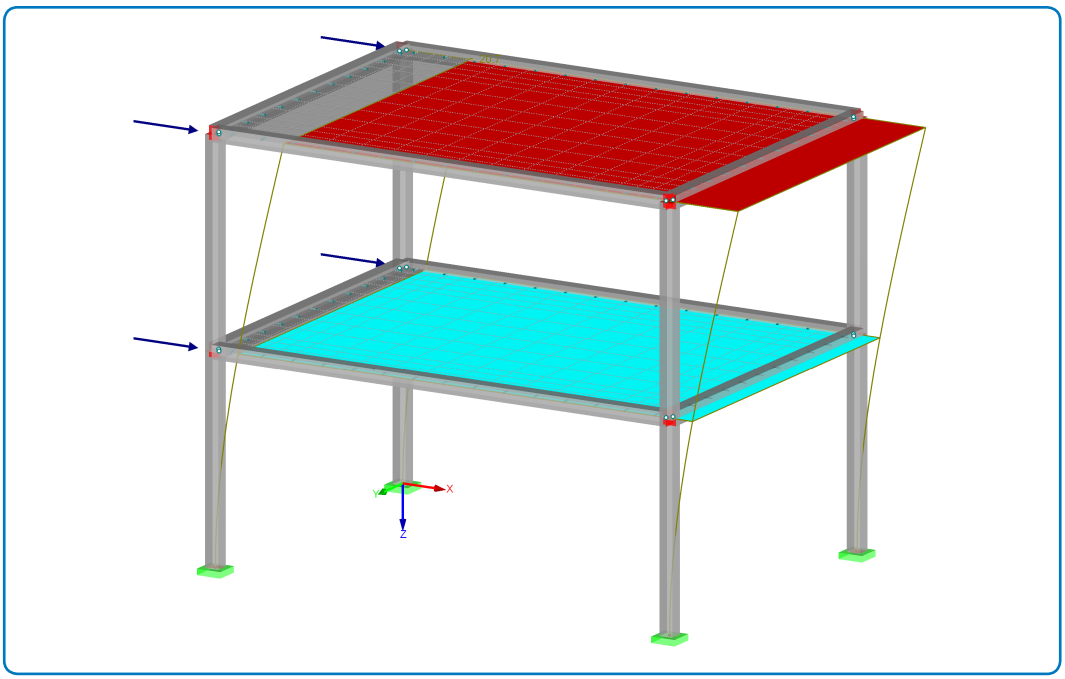

Figure 3: Structure modeled by means of the plates

Quantity	RFEM 5 Plate Model	RFEM 5 Diaphragm Constraint	Ratio
$u_{x,max}$ [mm]	20.683	20.683	1.000