Verification Example

Program: RFEM 5, RFEM 6

Category: NAFEMS Benchmark, Geometrically Linear Analysis, Isotropic Linear Elasticity, Shell, Member

Verification Example: NAFEMS LE 5 – Z-Section Cantilever

NAFEMS LE 5 – Z-Section Cantilever

Description

A Z–Section Cantilever is fully fixed at $x = 0$ and loaded by means of the torque $M = 1200$ kNm which is in case of shell model represented by means of the couple of shear forces.

Determine the axial stress σ_x at point A (at mid-surface) .

The problem is defined according The Standard NAFEMS Benchmarks [1] and it is described in **Figure 1** and by the following set of parameters.

Material	Isotropic	Modulus of Elasticity	E	210000.000	MPa
		Poisson's Ratio	ν	0.300	–
Load		Shear Force	F	600.000	kN

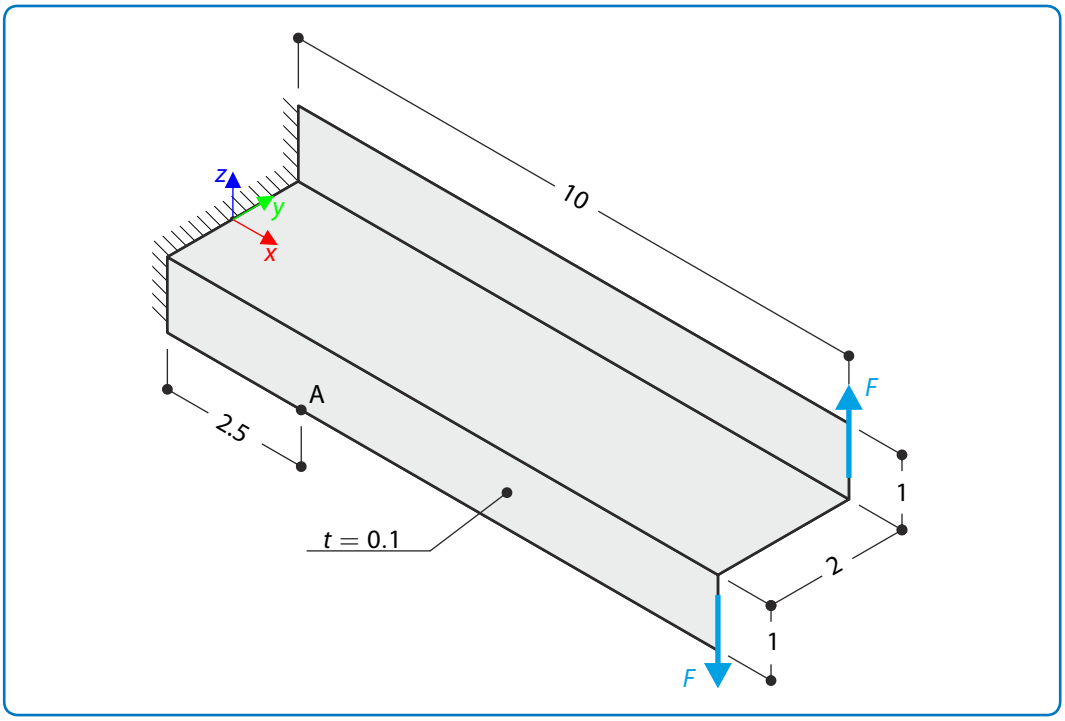

Figure 1: Problem sketch, dimensions are in meters

RFEM Settings

- Modeled in RFEM 5.26.01 and RFEM 6.01
- Isotropic linear elastic material model is used
- Mindlin plate bending theory is used

It is not possible to modeled given mesh in RFEM, thus it is modeled by finer mesh, see **Figure 2**. This is the most rough mesh, which can be modeled.

Results

Structure Files	Model	Program
LE05.01	Shell	RFEM 5, RFEM 6

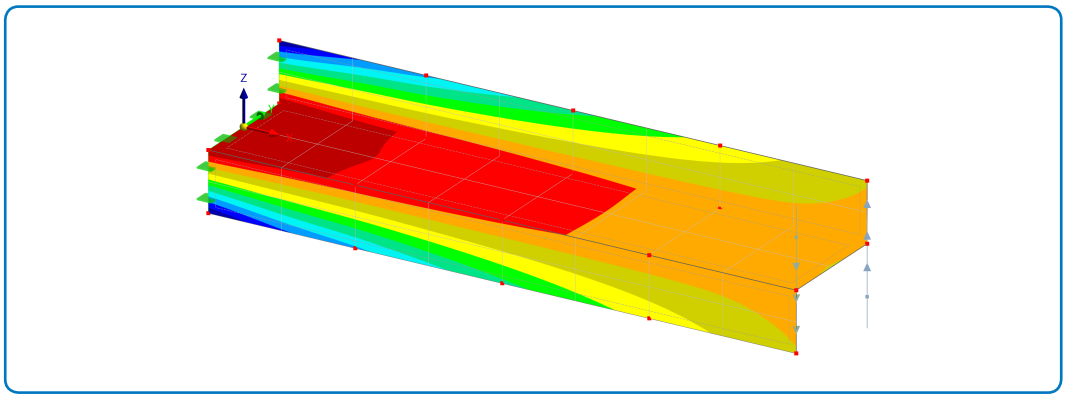

Figure 2: RFEM results ($\sigma_{x,m}$) and mesh overview

Model	Target	RFEM 5		RFEM 6	
	σ_x [MPa]	σ_x [MPa]	Ratio [-]	σ_x [MPa]	Ratio [-]
Shell	-108.0	−108.9	1.008	−108.9	1.008

References

[1] THE INTERNATIONAL ASSOCIATION FOR THE ENGINEERING ANALYSIS COMMUNITY, *The Standard NAFEMS Benchmarks*. NAFEMS Ltd., Glasgow, United Kingdom, 2012.