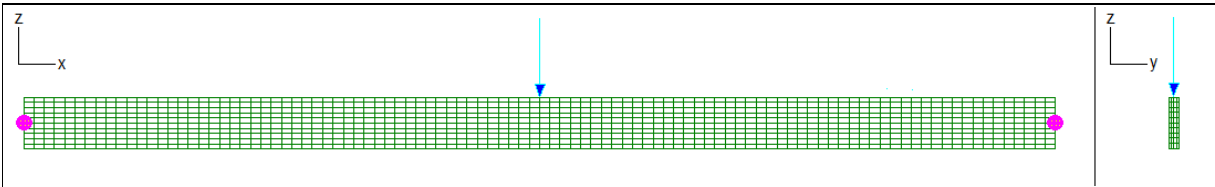


Validation of Sargon Nonlinear solver (CURAN, version 9.70)
TEST SO012 VALIDATION, CROSS CHECKS, RELIABILITY, BENCHMARK Marco Croci Rev.2-11/04/2011

Test description

Constitutive law of solids material: linear elastic. Solution should coincide with a linear elastic analysis solution.

Cross-check solver: CLEVER (Sargon)

 Test model: **curanSO_012.WSR**

 Target model: **C012SO_CLEVER.WSR**
Material properties

Name	ν	E
S235LE	0,3	210000N/mm ²

Model data

Beam			Constraints	Load (z direction)	
LENGTH	HEIGHT	THICKNESS	LEFT / RIGHT	APPLICATION POINT	FORCE
10000mm	500mm	100mm	Simple support	Middle point	-100000N

Solid elements	Type	d.o.f.
4000 (100x10x4)	BRICK8WI	16635

CROSS CHECK

 Displacement in the middle of the beam is $\delta = FL^3/48EI + L\chi T/2GA$ where χ is shear factor and T is internal shear force

Load case	Value	Unit	CURAN	TARGET	KIND	% diff.
1	Node 2348 displacement (z)	mm	-9,579E+00	-9,598E+00	theoretical	-0,20
1	σ_x element 2048, node 2324	N/mm ²	4,620E+01	4,619E+01	cross-check	0,02
1	Node 2844 reaction (z)	N/mm ²	1,203E+04	1,203E+04	cross-check	0,00

 $\% \text{ difference} = (\text{CURAN} - \text{CLEVER}) / \text{CLEVER} * 100$

Precision of limit multiplier for the analysis: 0.005

BRICK8WI: isoparametric element with Wilson-Ibrahimbegovic modification