

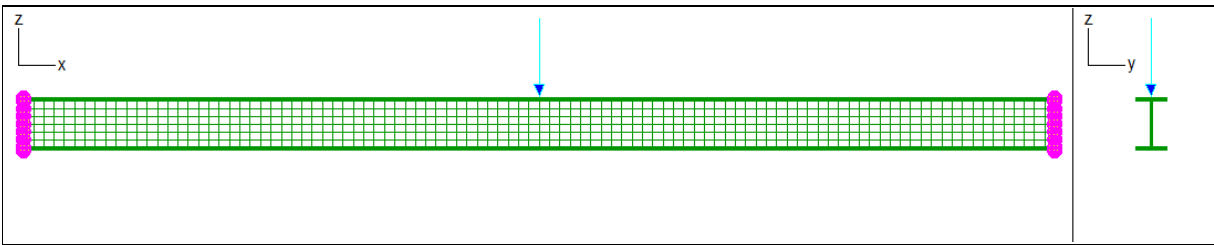
Validation of Sargon Nonlinear solver (CURAN, version 9.60)

TEST SO018

VALIDATION, CROSS CHECKS, RELIABILITY, BENCHMARK

Marco Croci

01/12/2010



Test description

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

Theoretical check and cross-check with Sargon linear solver (CLEVER)

Test model: curanso_018.WSR

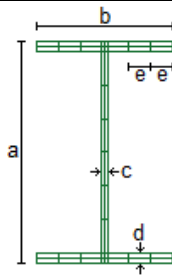
Target model: C018SO_CLEVER.WSR

Material properties

Name	ν	E
S235LE	0,3	210000N/mm ²

Model data

Beam		Constraints		Load (z direction)	
LENGTH	SHAPE SIZES	LEFT	RIGHT	APPLICATION P.	FORCE
10000mm	See image	Fixed	Fixed	Middle point	-100000N
a	b	c	d	e	
500mm	300mm	14,5mm	28mm	50mm	
Solid elements		Type		d.o.f.	
4400		BRICK8		20493	



CROSS CHECK

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

Load case	Value	Unit	CURAN	TARGET	KIND	% diff.
1	Node 1638 displacement (z)	mm	-2,770E+00	-2,806E+00	theoretical	-1,28
1	σ_x element 2952, node 4052	N/mm ²	2,752E+01	2,752E+01	cross-check	0,00
1	τ_{zx} element 2952, node 4052	N/mm ²	3,601E+00	3,601E+00	cross-check	0,00

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

Precision of limit multiplier for the analysis: 0.005
BRICK8: trilinear isoparametric element