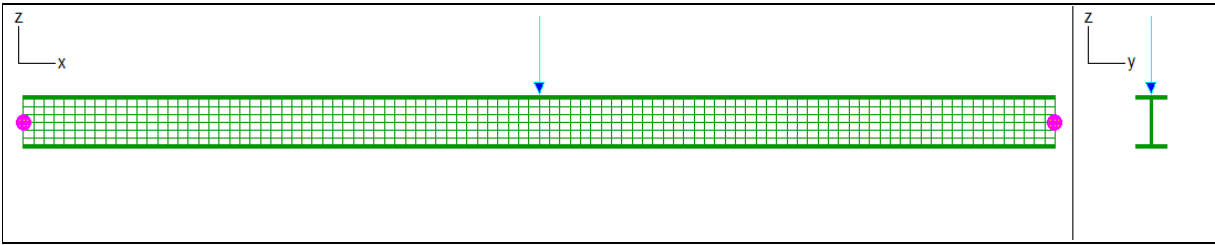


| | | | |
|--|---|--------------------|-------------------|
| Validation of Sargon Nonlinear solver (CURAN, version 9.60) | | | |
| TEST SO022 | VALIDATION, CROSS CHECKS, RELIABILITY, BENCHMARK | Marco Croci | 02/12/2010 |

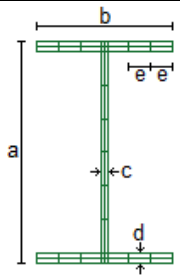


| Test description | |
|--|--|
| Constitutive law of membranes material: linear elastic. Solution should coincide with a linear elastic solution. | |
| Theoretical check and cross-check with Sargon linear solver (CLEVER) | |
| Test model: curanso_022.WSR | Target model: C022SO_CLEVER.WSR |

| 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 | Simple support | Middle point | -100000N |
| a | b | c | d | e |
| 500mm | 300mm | 14,5mm | 28mm | 50mm |
| Solid elements | | Type | d.o.f. | |
| 4400 | | BRICK8 | 20889 | |



| CROSS CHECK |
|-------------|
|-------------|

| Load case | Value | Unit | CURAN | TARGET | KIND | % diff. |
|-----------|------------------------------------|-------------------|------------|------------|-------------|---------|
| 1 | Node 1843 displacement (z) | mm | -9,878E+00 | -9,943E+00 | theoretical | -0,65 |
| 1 | σ_x element 2952, node 4052 | N/mm ² | 5,583E+01 | 5,583E+01 | cross-check | 0,00 |
| 1 | σ_z element 2952, node 4052 | N/mm ² | 1,305E+00 | 1,305E+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