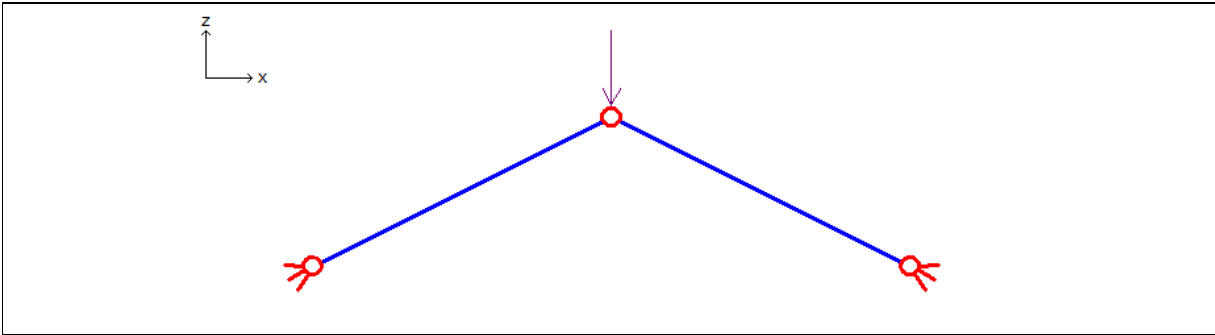


**Validation of Sargon Nonlinear solver (CURAN, version 9.60)**

**TEST TR020**

**VALIDATION, RELIABILITY, BENCHMARK**

**Marco Croci Rev.2-03/12/2010**



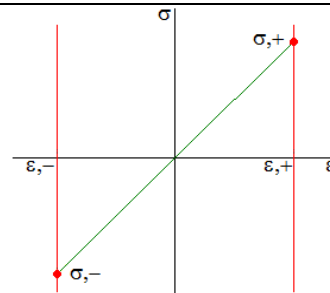
**Test description**

Constitutive law of trusses material: linear elastic with very small ultimate strain. If limit strain is exceeded (or equivalently limit stress) structure failure occurs.

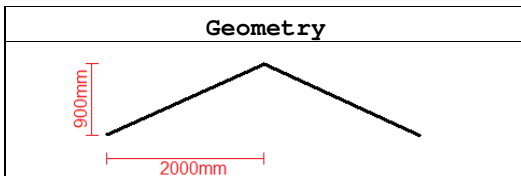
Test model: **curanTR\_020.WSR**

**Material properties**

Name	S235brittle
$\nu$	0,3
E	210000N/mm <sup>2</sup>
$\epsilon_{,+}$	0,0005
$\epsilon_{,-}$	-0,0005
$\sigma_{,+}$	105N/mm <sup>2</sup>
$\sigma_{,-}$	-105N/mm <sup>2</sup>



**Cross-section:** circular section, diameter=40mm (area=1256,64mm<sup>2</sup>)



**Force (z direction)**

Load case 1	F= - 300000N
Load case 2	F= + 300000N
Load path: not active	

**CHECK**

Considering an indefinitely elastic analysis (test 001), stress should be equal to 290,9N/mm<sup>2</sup>, greater than ultimate stress. Failure load level should be equal to 105N/mm<sup>2</sup> / 290,9N/mm<sup>2</sup> = 0,3609.

Load case	Value	Unit	CURAN	THEORETICAL	% diff.
1	Failure load level	/	3,605E-01	3,610E-01	-0,13
1	Truss #1 normal stress	mm	-1,049E+02	-1,050E+02	-0,10
2	Failure load level	/	3,605E-01	3,610E-01	-0,13
2	Truss #1 normal stress	mm	1,049E+02	1,050E+02	-0,10

% difference = (CURAN - THEORETICAL) / THEORETICAL \* 100

Precision of limit multiplier for the analysis: 0.001