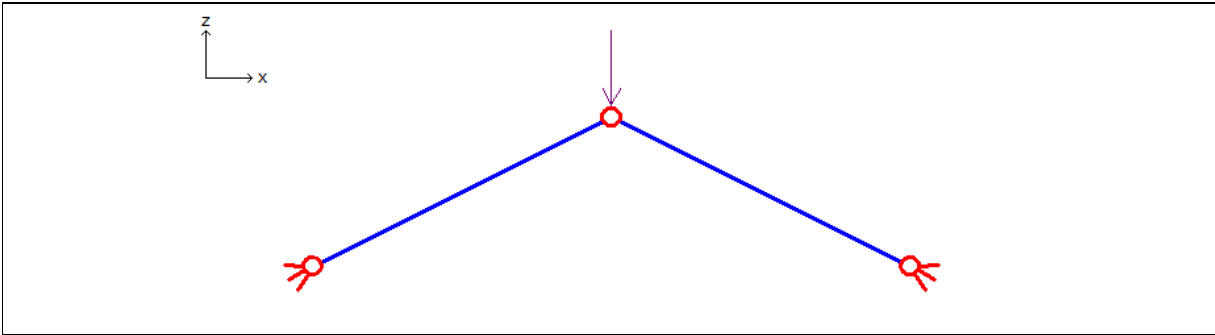


**Validation of Sargon Nonlinear solver (CURAN, version 9.60)**

**TEST TR010**

VALIDATION, RELIABILITY, BENCHMARK

Marco Croci Rev.2-03/12/2010



**Test description**

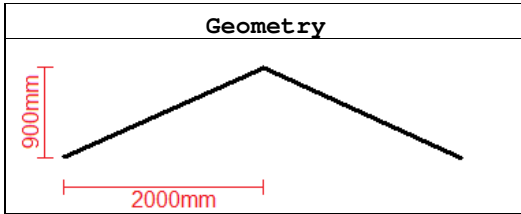
Constitutive law of trusses material: elastic-perfectly plastic  
Applied force causes  $f_y$  exceeding: the structure collapses when  $f_y$  is reached.

Test model: **curanTR\_010.WSR**

**Material properties**

Name	$f_y$	$\nu$	E
S235EP	235Nmm <sup>2</sup>	0,3	210000N/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**

In a linear elastic case, applied force will cause a displacement equal to 0,7403mm and a normal stress in trusses equal to 290,9N/mm<sup>2</sup> (see test 001). Here maximum normal stress can not exceed 235N/mm<sup>2</sup>. Collapse occurs at a load level equal to 235/290,9=0,8078 and displacement should be equal to 0,7403mm\*0,8078=0,598mm.

Load case	Value	Unit	CURAN	THEORETICAL	% diff.
1	Failure load level	/	8,067E-01	8,078E-01	-0,14
1	Truss #1 normal stress	N/mm <sup>2</sup>	-2,347E+02	-2,350E+02	-0,13
2	Node #8 displacement (z)	mm	5,972E+00	5,980E+00	-0,14
2	Truss #1 normal stress	N/mm <sup>2</sup>	2,347E+02	2,350E+02	-0,13

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

Note: precision of limit multiplier for the analysis: 0.001