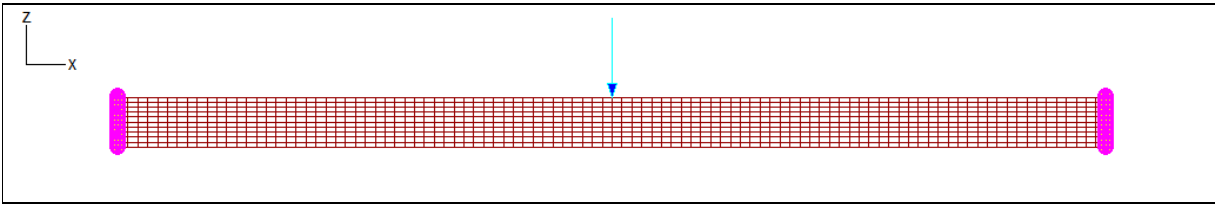


**Validation of Sargon Nonlinear solver (CURAN, version 9.70)**

**TEST MB027** VALIDATION, CROSS CHECKS, RELIABILITY, BENCHMARK Marco Croci Rev.1-21/03/2011



**Test description**

Constitutive law of membranes material: elastic-perfectly plastic.  
When limit load is exceeded there is a collapse.

Test model: **curanMB\_027.WSR**

**Material properties**

Name	$\nu$	$f_y$	E
S235PP	0,3	235N/mm <sup>2</sup>	210000N/mm <sup>2</sup>

Beam			Constraints		Load (z direction)	
LENGTH L	HEIGHT h	THICKNESS b	LEFT	RIGHT	APPLICATION POINT	FORCE F
1000mm	500mm	100mm	Fixed	Fixed	Middle point	-1600000N

**Model data**

Membrane elements	Type	Thickness	d.o.f.
1000 (10x100)	QM6WI	100mm	2178

**CHECK**

Theor. limit load is  $F_{lim}=8*bh^2/4*f_y/L=1175000N$ . Load multiplier is  $F_{lim}/F=0,7344$

Load case	Value	Unit	CURAN	TARGET	KIND	% diff.
1	Load multiplier	/	7,331E-01	7,344E-01	theoretical	-0,17

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

Precision of limit multiplier for the analysis: 0.005

QM6WI: 4 nodes incompatible element with Wilson-Ibrahimbegovic modification