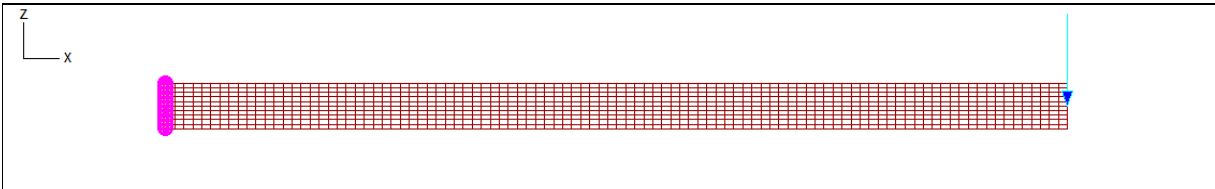


Validation of Sargon Nonlinear solver (CURAN, version 9.70)			
TEST MB037	VALIDATION, CROSS CHECKS, RELIABILITY, BENCHMARK	Marco Croci	Rev.1-06/04/2011



Test description
Constitutive law of membranes material: elastic-perfectly plastic. When limit load is exceeded there is a collapse.
Test model: curanMB_037.WSR

Material properties			
Name	ν	f_y	E
S235PP	0,3	235N/mm ²	210000N/mm ²

Beam			Constraints		Load (z direction)	
LENGTH L	HEIGHT h	THICKNESS b	LEFT	RIGHT	APPLICATION POINT	FORCE F
10000mm	500mm	100mm	Fixed	Free	Right end	-200000N

Model data			
Membrane elements	Type	Thickness	d.o.f.
1000 (10x100)	QUAD4	100mm	2200

CHECK

Theoretical limit load is $F_{lim} = bh^2/4 * f_v / L = 146875N$. Load multiplier is $F_{lim} / F = 0,7344$

Load case	Value	Unit	CURAN	TARGET	KIND	% diff.
1	Load multiplier	/	7,828E-01	7,344E-01	theoretical	6,59

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

Precision of limit multiplier for the analysis: 0.005
QUAD4: bilinear isoparametric element