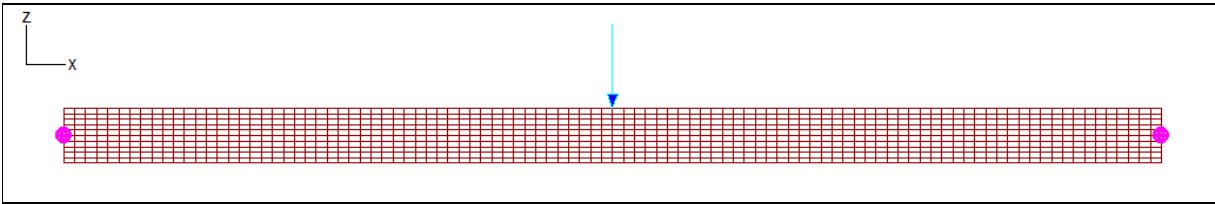


<b>Validation of Sargon Nonlinear solver (CURAN, version 9.70)</b>			
<b>TEST MB029</b>	<b>VALIDATION, CROSS CHECKS, RELIABILITY, BENCHMARK</b>	<b>Marco Croci</b>	<b>Rev.1-21/03/2011</b>



<b>Test description</b>
Constitutive law of membranes material: elastic-perfectly plastic. When limit load is exceeded there is a collapse.
Test model: <b>curanMB_029.WSR</b>

<b>Material properties</b>			
Name	v	$f_y$	E
S235PP	0,3	235N/mm <sup>2</sup>	210000N/mm <sup>2</sup>

<b>Beam</b>			<b>Constraints</b>		<b>Load (z direction)</b>	
LENGTH L	HEIGHT h	THICKNESS b	LEFT	RIGHT	APPLICATION POINT	FORCE F
1000mm	500mm	100mm	Simple support		Middle point	-120000N

<b>Model data</b>			
Membrane elements	Type	Thickness	d.o.f.
1000 (10x100)	QM6WI	100mm	2218

<b>CHECK</b>
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Theoretical limit load is  $F_{lim}=bh^2*f_y/L=587500N$ . Load multiplier is  $F_{lim}/F=0,4896$

Load case	Value	Unit	CURAN	TARGET	KIND	% diff.
1	Load multiplier	/	4,882E-01	4,896E-01	theoretical	-0,28

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

Precision of limit multiplier for the analysis: 0.005  
QM6WI: 4 nodes incompatible element with Wilson-Ibrahimbegovic modification