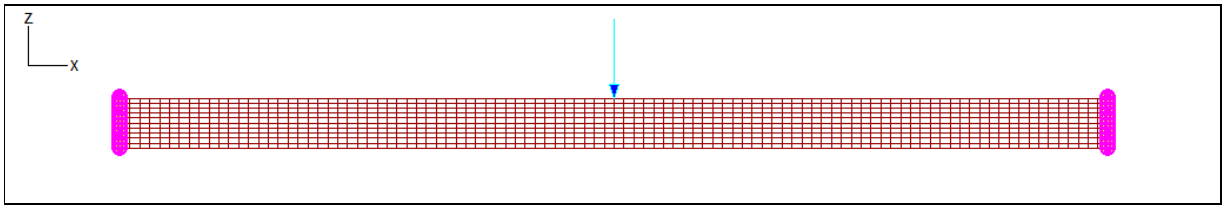
Validation of Sargon Nonlinear solver (CURAN, version 9.70)			
TEST MB040	**VALIDATION, CROSS CHECKS, RELIABILITY, BENCHMARK**	**Marco Croci**	**Rev.1-08/04/2011**



Test description
Constitutive law of membranes material: elasto-plastic (bilinear).
Test model: **curanMB_040.WSR**

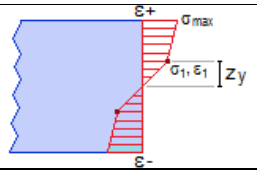
Material properties					
Name	ν	ε_1	σ_1	ε_2	σ_2
S235_EP2_ISO	0,3	0,001119	235N/mm^2	0,01678	360N/mm^2

Beam			Constraints		Load (z direction)	
LENGTH L	HEIGHT h	THICKNESS b	LEFT	RIGHT	APPLICATION POINT	FORCE F
10000mm	500mm	100mm	Fixed	Fixed	Middle point	-1600000N

Model data			
Membrane elements	Type	Thickness	d.o.f.
1000 (10x100)	QUAD4	100mm	2178

CHECK

The check is done considering maximum normal stress in x direction, using the following formula: $\sigma_{max}=\sigma_1+(\varepsilon-\varepsilon_1)*E_t$ where $\varepsilon=h*\sigma_y/(2*E*z_y)$. z_y is the height where s_1 is reached



Load case	Value	Unit	CURAN	TARGET	KIND	% diff.
1	σ_x element 10, node 17	N/mm^2	3,808E+02	3,674E+02	theoretical	3,65

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

Precision of limit multiplier for the analysis: 0.01
Interpolation in stress recovery: not required
QUAD4: bilinear isoparametric element