CURAN: BEAMS (HERMITIAN)	TEST 013	rev.1 21/10/13	version 10.70
VALIDATION, CROSS CHECKS, RELIABILITY, BENCHMARK	Tested by: Marco Croci – Checked by: Paolo Rugarli		
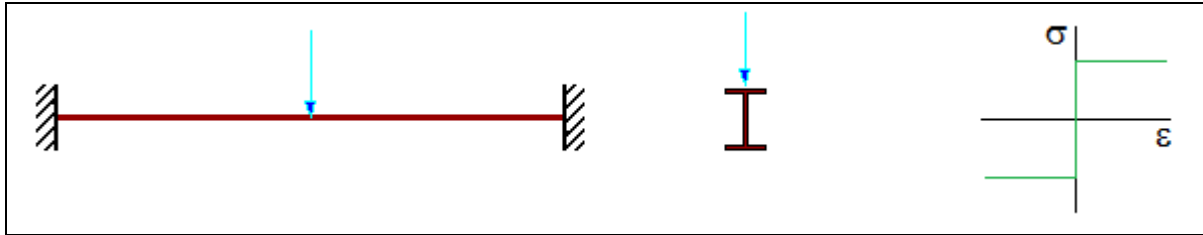
MODEL

MODEL NAME	OUTPUT FILE	ANALYSIS TYPE
curanBE_013.WSR	curanBE_013.cog	nonlinear static (Curan)

DATA

L [mm]	P [N]	σ_y [N/mm^2]	W_{pl} [mm^3]
5000	500000	235	776000

THEORETICAL COMPUTATION

Cross section maximum bending moment is equal to

$$M_{pl} = W_{pl} \cdot \sigma_y = 1.824E + 08 Nmm$$

and occurs when a force equal to P$_{lim}$ is applied:

$$P_{lim} = \frac{8M_{pl}}{L} = 291776N < P$$

Since the applied load exceeds the limit load, a load multiplier is computed:

$$\frac{P_{lim}}{P} = 0.5836$$

CROSS-CHECK

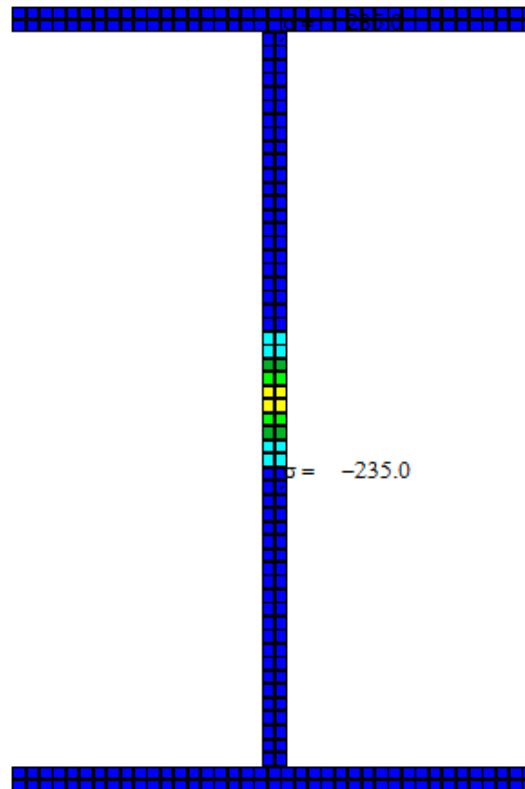| Value	Theory	Sargon	% difference (S-T)/T*100
Load multiplier	0.5836	0.5839	0.1

NOTES
- force is parallel to web (strong axis bending).
- shear area: not considered.
- Analysis parameters: Lobatto's points: 5. Fibers number: 250
- Mesh is more refined at midspan and constraints, where 300mm of the member are divided into 10 elements (on both sides at midspan)

NONLINEAR FIBER MODEL ANALYSIS RESULTS - NORMAL STRESS
Beam #1 Lobatto's section #1 (csi = -1.000) Lcase = 1 / 1
Sigma, max=   235.0 N/mm²;   Sigma, min=   -235.0 N/mm²;

σ =   -235.0