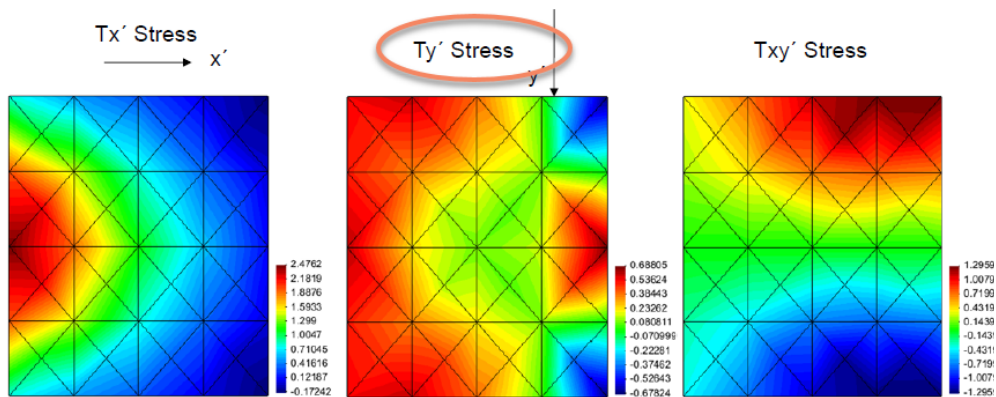# *Assignment Shells*

a)Explain the behaviour of the membrane T_y' stress presented in the previous example

Membrane stress is a tensile or compressive stress which is uniform through thickness. These is an axial force..


1. Boundary conditions generate a symmetry along x-axis
2. Blue works through tension while red works through compression
3. At the free (right) boundary, within y'-axis, center has max. compression stress, which balances when we tend to corners, which work with tension stress.
4. At the symmetric fixed sides, despite the bigger tension, there isn't any displacement, and rotation except in the right corners.

b)Analyze the same shell case with a point load located at the center.

We analyze this exercise with *cubierta4* file.
First, Max. displacement with denss=1 in x-direction delivers a max. displacement on node 36, of around 13.
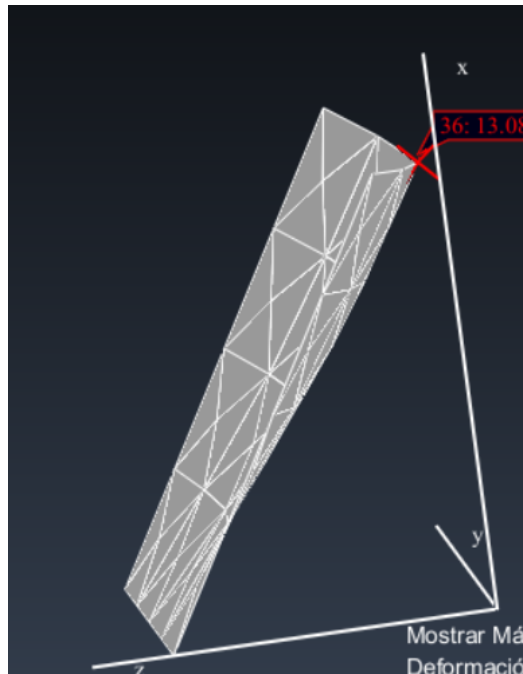
We proceed with the comparison. It is erased the body force "denss". Same E,*v* and , t, are assumed, as also same fixed displacements.

Second, a force with the same summed value of the distributed *denss* is located at the center of the square (node 15). Given that surface is square, with sides 10x10, the equivalent is 10x10=100. Denss has direction of x-axis (global).

The surface angle is 60ºC between z-x axis. *Pointload* is defined within global coordinates, with x-axis as main direction. So equivalent force in x-axis must be negative in order to match gravity sense.

First term of *pointload* is node 15 (center) and second term would define force direction, being 1 x-axis (global), 2 y-axis, 3 z-axis.

pointload = [15,1,-100]

So in this case, max displacement matches again node 15.