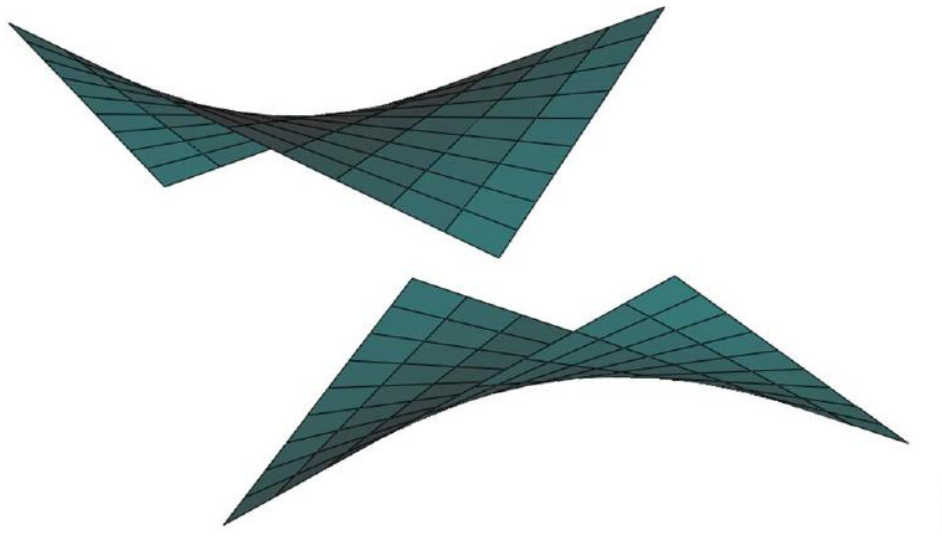# Computational Structural Mechanics and Dynamics

Assignment 8

Oriol Call Piñol

Analyze the following concrete hyperbolic Shell under self-weight. Explain the behavior of all the stresses presented. The thickness is assigned to be 0.1.


In a first instance, we will draw the geometry in GiD as the statement says. We will need to introduce Shells in the problem type folder from the Mat-Fem CiMNE's library.

As in this exercise we are only considering the self-weight of the system, no condition apart from the displacement constraints applied on the edges of the shell will be added to the system. This will be the look of our structure shell seen from above, now we will apply boundary conditions and a proper mesh.
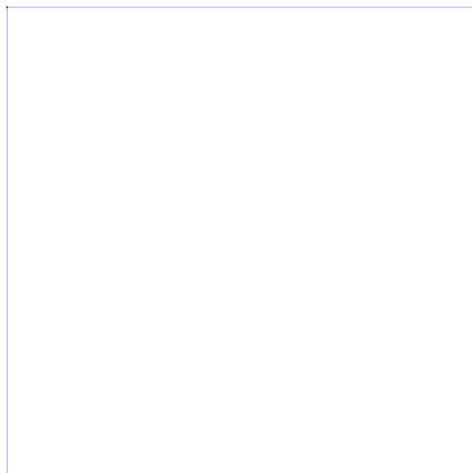
As we can see below, after applying the displacements constraints to the boundary of the structure, this figure shows up:
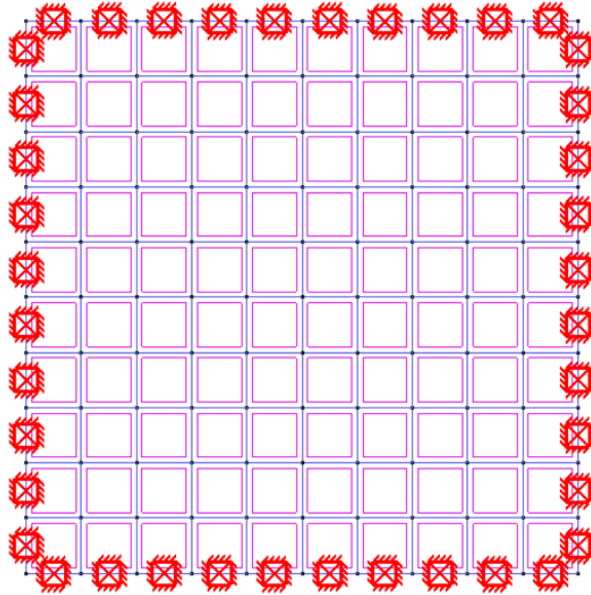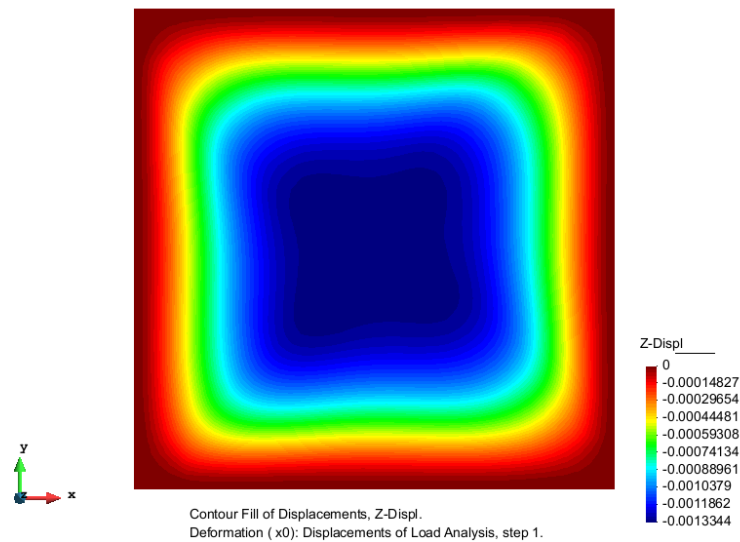
Now we will apply the mesh, to do this, we choose standard structured mesh using linear triangles.
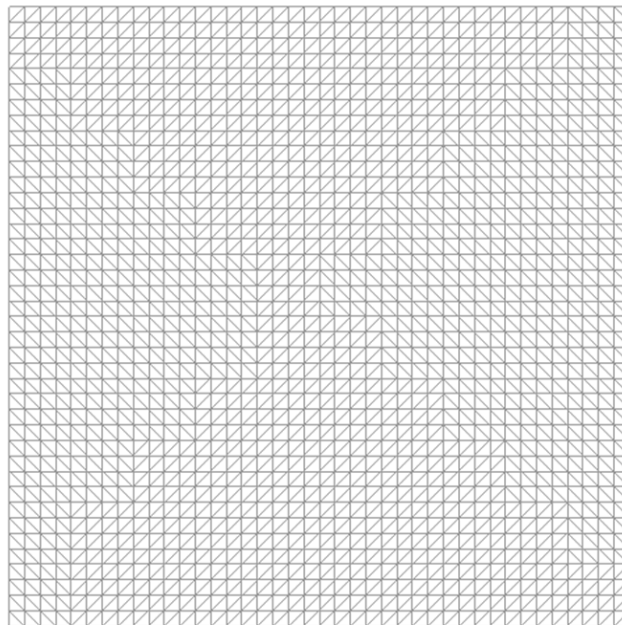
For the results, we imported the results generated by GiD to matlab using "Write MATLAB input file". However, we will have to take into consideration that there are few things that we will have to modify before computing the results using MATLAB. The first one is changing the variable "Fixdesp" to "fixnodes" and the second one is using the matlab command full, we will change the input for "frpintf" in "ToGid_shell.m" from sparse double type to normal double. Once these changes have been made, we can open the results in Gid again and proceed to the post process.

The results found using this configuration are the following:

Contour Fill of Displacements, Z-Displ.
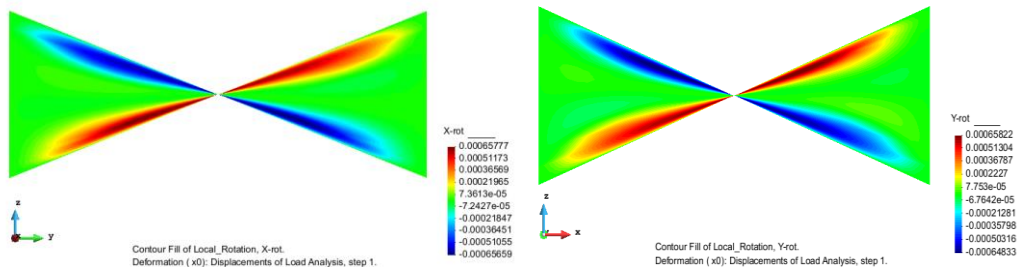Deformation (x0): Displacements of Load Analysis, step 1.

In this figure we can appreciate the displacements on the Z component, as it's logical, the maximum displacements are on the middle, due to be the furthest part to the zero displacement edges.

Contour Fill of Displacements, Y-Displ.
Deformation (x0): Displacements of Load Analysis, step 1.
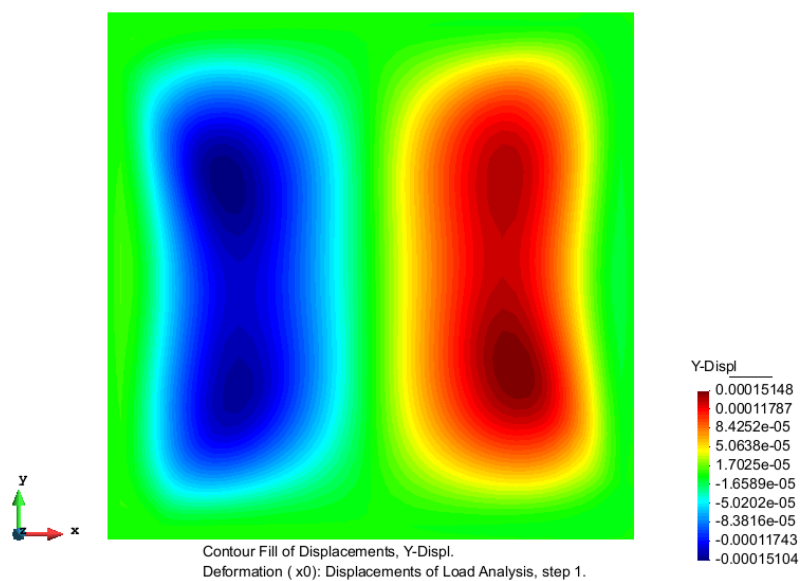
In this figure we can see the displacements following the Y component. We can comment that the left part seems to have a tiny displacement in the positive direction and symmetrically we can also appreciate the same displacement, this time in the negative sense, in the right part of the system.

Contour Fill of Displacements, X-Displ.
Deformation (x0): Displacements of Load Analysis, step 1.
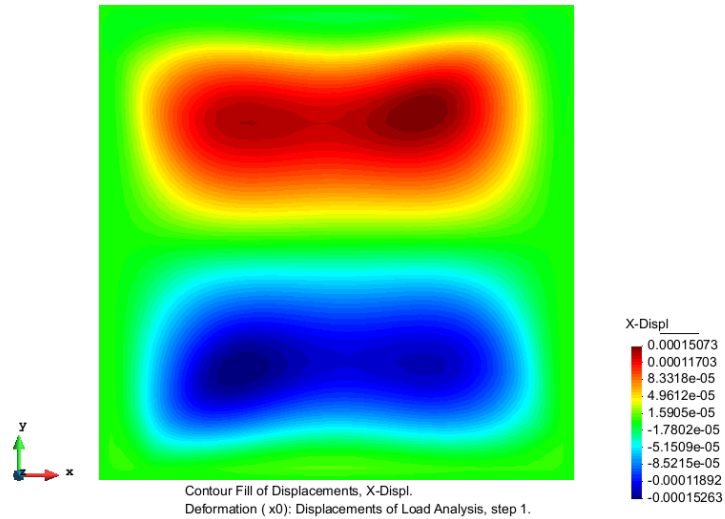
As seen above, the displacements following the X component have a very similar behavior to the Y displacements; this is due to the geometry of the system and its symmetric boundary conditions.

Contour Fill of Local_Rotation, X-rot.
Deformation (x0): Displacements of Load Analysis, step 1.

Contour Fill of Local_Rotation, Y-rot.
Deformation (x0): Displacements of Load Analysis, step 1.

Here we can see the rotation following the X and Y axis respectively. As expected, we get symmetric results in both cases due to the geometry.

In conclusion, we have to say that this exercise enabled us to use Matlab and GiD for one common objective and it enlarged our knowledge in shells and both softwares.