

Objective

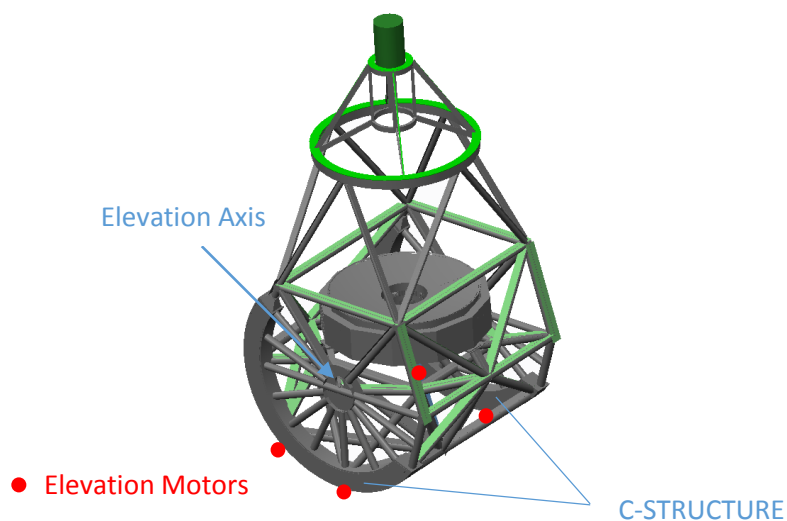
During the first Conceptual Design Study of EST Project (2008-2011), several alternatives for the Telescope Structure were considered, more particularly Gantry and Rocking-Chair models were developed. The objectives of the current study (2014-2015) are to carry on with the structural analysis and close the telescope structure trade-off, then optimize the structural concept chosen in order to meet the scientific requirements.

Analysis

Recent results obtained from FEM Simulations can show some advantages for Gantry model. In particular, the optical sensitivity analysis reveals that the values obtained for the image motion with the Gantry Model are lower than the ones obtained for Rocking-Chair, as shown in the following table:

IMAGE MOTION AT COUDE ROOM [arcsec]			
LOAD	FE MODEL		ERROR - BUDGET VALUE
	ROCKING-CHAIR	GANTRY	
GRAVITY	0,618	0,530	0,500
STATIC WIND (11.5 m/s)	3,488	3,100	2,000
DYNAMIC WIND (3.5 m/s)	2,123	1,887	0,800

Those results were obtained considering Gravity, Static and Dynamic Wind Loads, and some modifications were introduced to the models of the previous analysis in order to take into account the effects of the elevation motor brakes (not considered in Gantry FEM). The results also underline a better behaviour of Gantry Model by placing the elevation motors in the lower track of the C-Structure, instead of in the elevation axis.



The eigenfrequency obtained for this configuration about the elevation axis is 13 Hz, to be compared to 9.35 Hz for Rocking-Chair Model and 5.72 Hz for Gantry Model with the elevation motors placed in the elevation axis.

Current results are based on static analysis – Dynamic wind deformations are being studied considering the structural dynamic behaviour.

Next step

The next step of the study consists in developing a new FE Model based on the Yoke configuration; the results are expected to be slightly worse, but this design presents some mechanical advantages, like the cable-wrap and transfer-optics located in separate regions.