Optomechanical design software for segmented mirrors

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INTRODUCTION

A software package is presented herewith which allows efficient analysis of many aspects of an optomechanical system. In particular great emphasis is put on **Segmented Mirrors** systems. A 3d graphical interface is implemented, helping on scientific visualization of requested results.

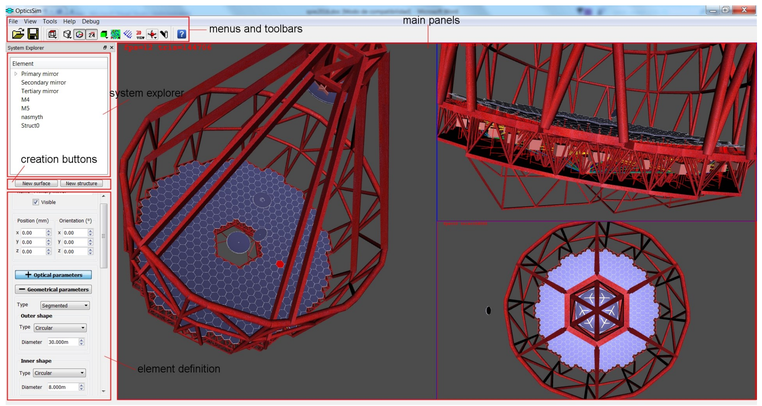


Fig. 1 Graphical interface

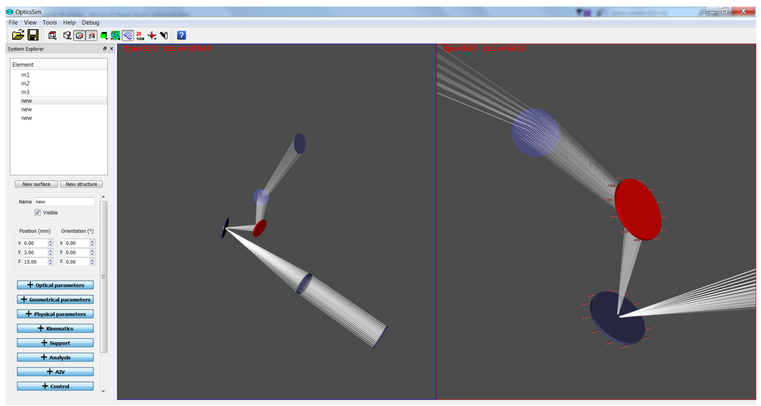


Fig. 2 Many lenses system with raytracing

FEM is also possible through ANSYS scripts

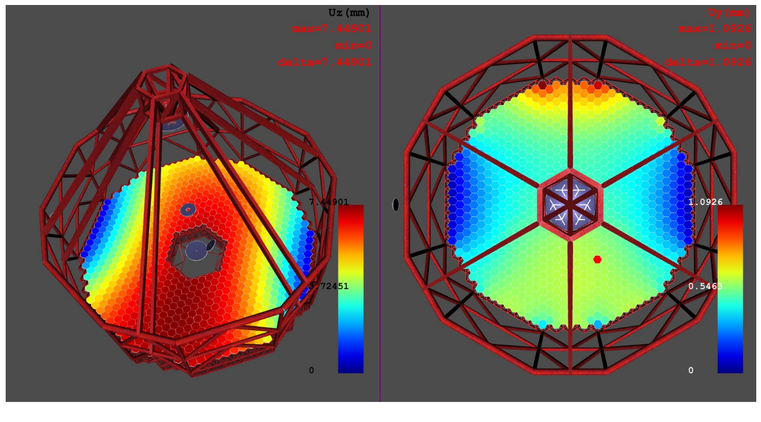


Fig. 3 FEM results. Deflection of Segmented mirror

METHODS

All objects including segmented mirrors are created on the fly following a set of construction rules.

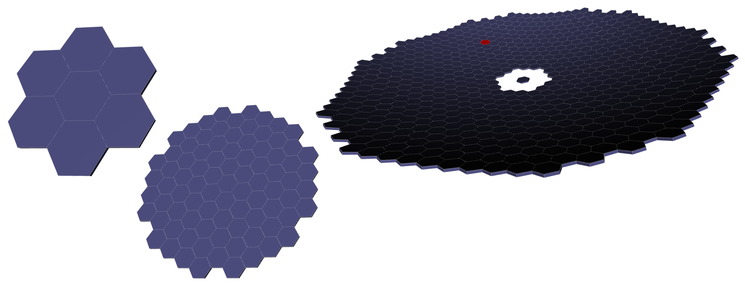
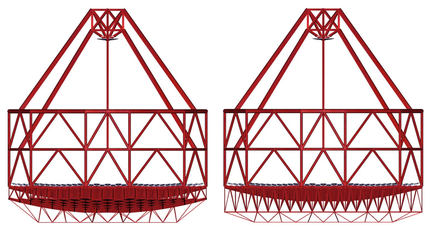


Fig. 4 Examples of segmented mirrors



Structures and supporting systems are also parametrically created on the fly.

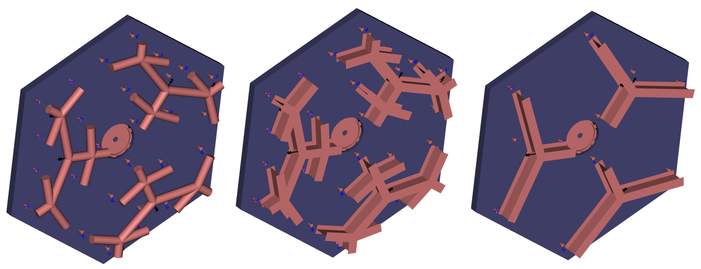


Fig. 5 Examples of support structures

Accessibility analysis is possible on 1st or 3rd person view.

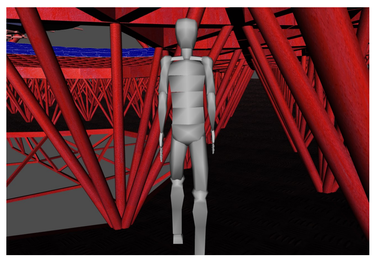
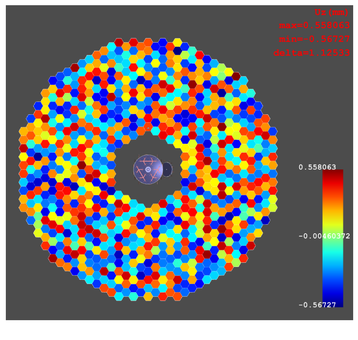


Fig. 6 3rd person view



Integration tolerances are considered statistically to compute integration error budgets.

Fig. 7 AIV errors on segmented mirror

RESULTS

Results can be presented on a variety of ways.

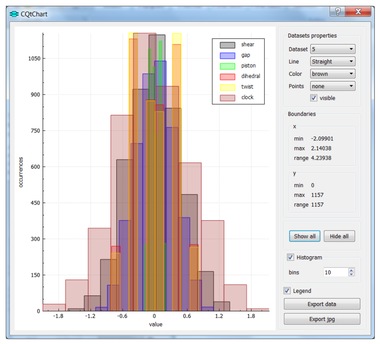


Fig. 9 Edge Sensors catching range results

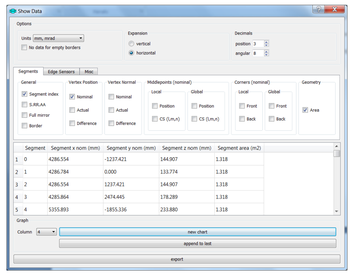


Fig. 8 Tabulated data form

Wavefront analysis is also possible, including active shape elements effects.

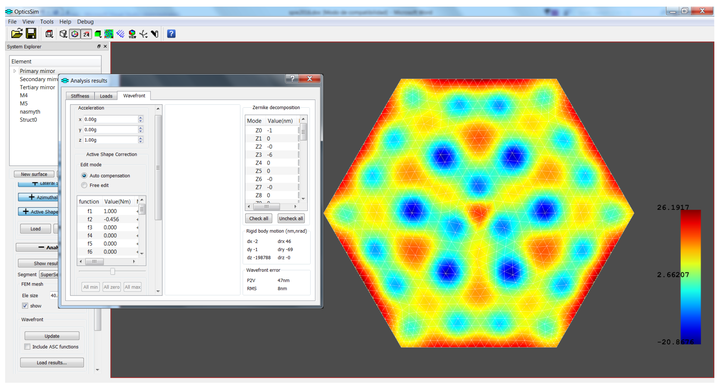


Fig. 10 Segmented mirror wavefront analysis

CONCLUSIONS

The software presented has already helped on defining several budgets for the E-ELT, assessing collision probabilities and PACT stroke estimation among other analyses.

Future work is planned on issues like:

- Optimization of support points positions and forces.
- Surface error budget automatic generation.
- Import Zemax definition files.
- Integrated FEM code.
- Simulation of a wide range of supporting conditions.
- Creation wizards to generate well known configurations.

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