

Freeform surface measurement as an example for the advantages of the use of databases in measurement setups

T. Binkele, D. Hilbig, T. Henning, F. Fleischmann

Faculty of Electrical Engineering and Computer Science, University of Applied Science Bremen, Germany

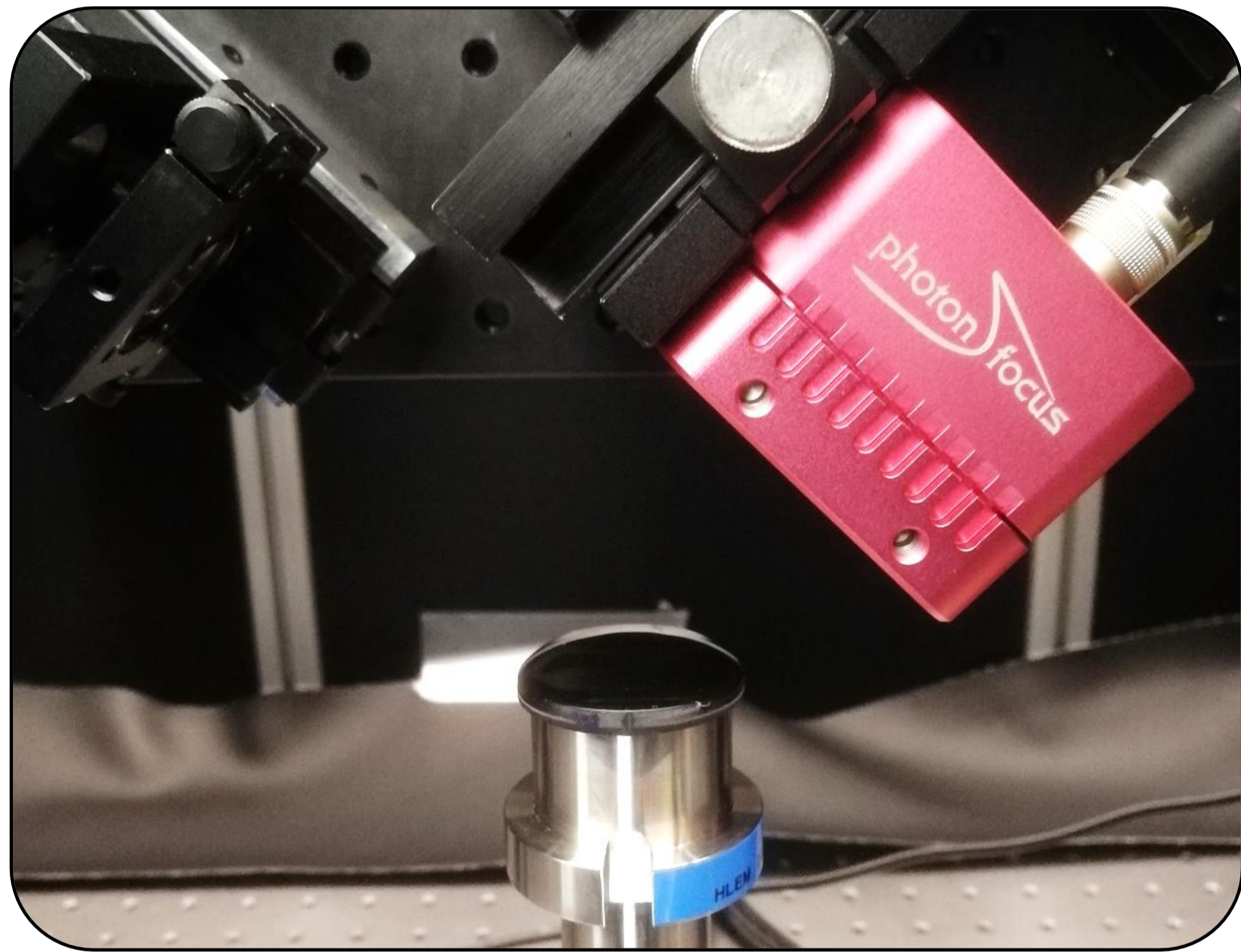
Introduction

In the scientific world, the advantages from different fields are often combined to create a more advanced system or device. In this work, we present a new measurement technique for freeform surface measurement and the usage of a database to combine different programming languages in one measurement system.

Freeform surface measurement system with Database

Experimental Measurement

The measurement principle is based on a variation of experimental ray tracing¹. By investigation of the direction of a reflected ray from different positions of the DUT, its gradients can be determined. Applying appropriate integration algorithms, its topography can be reconstructed².

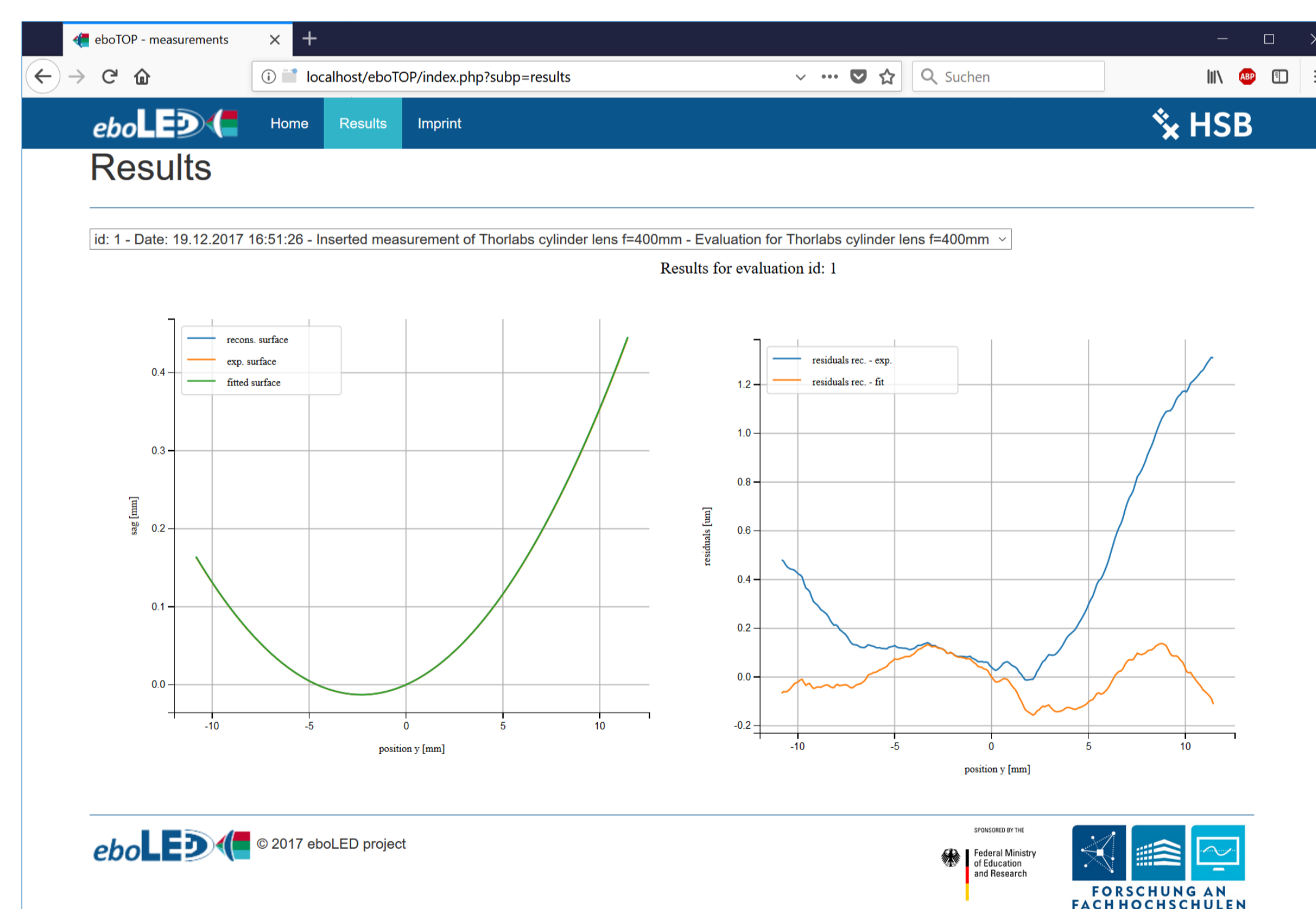
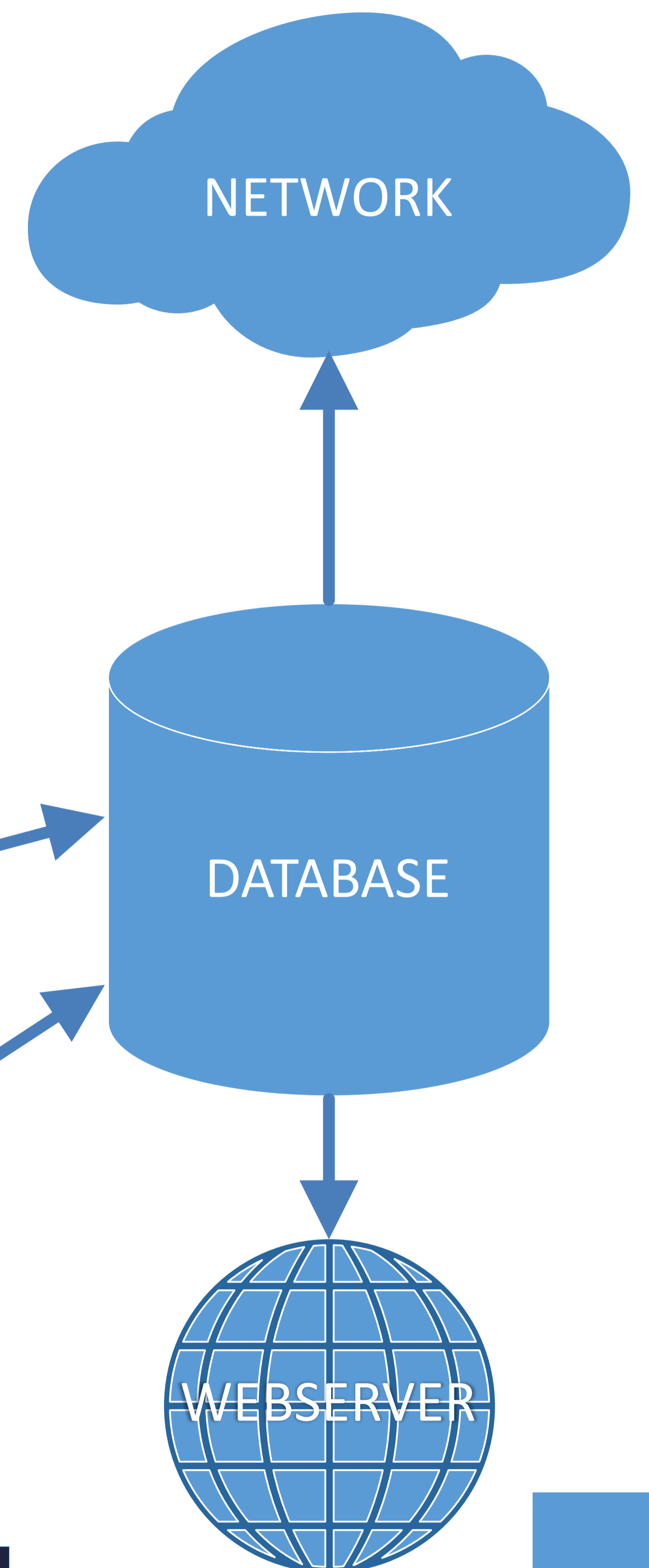
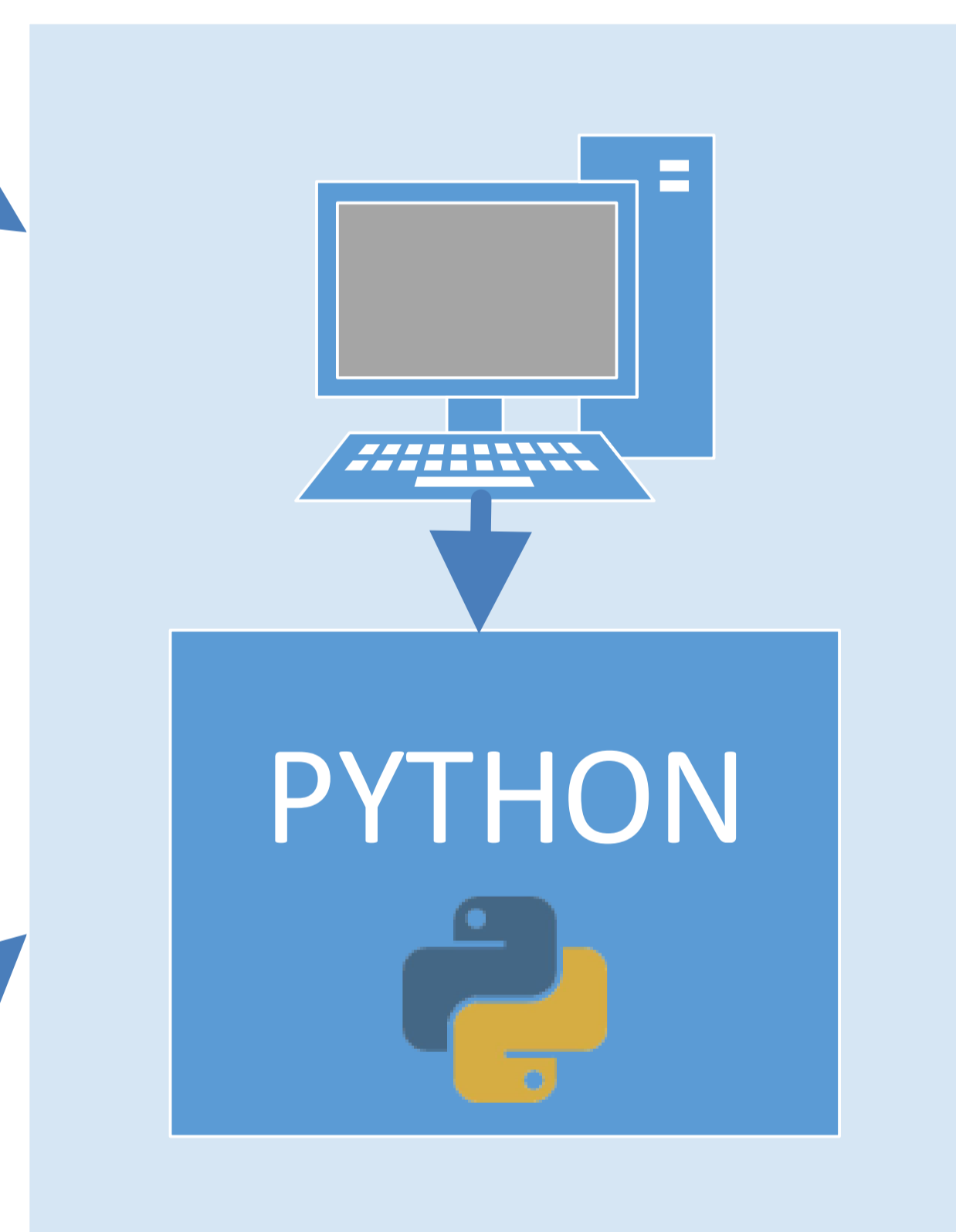
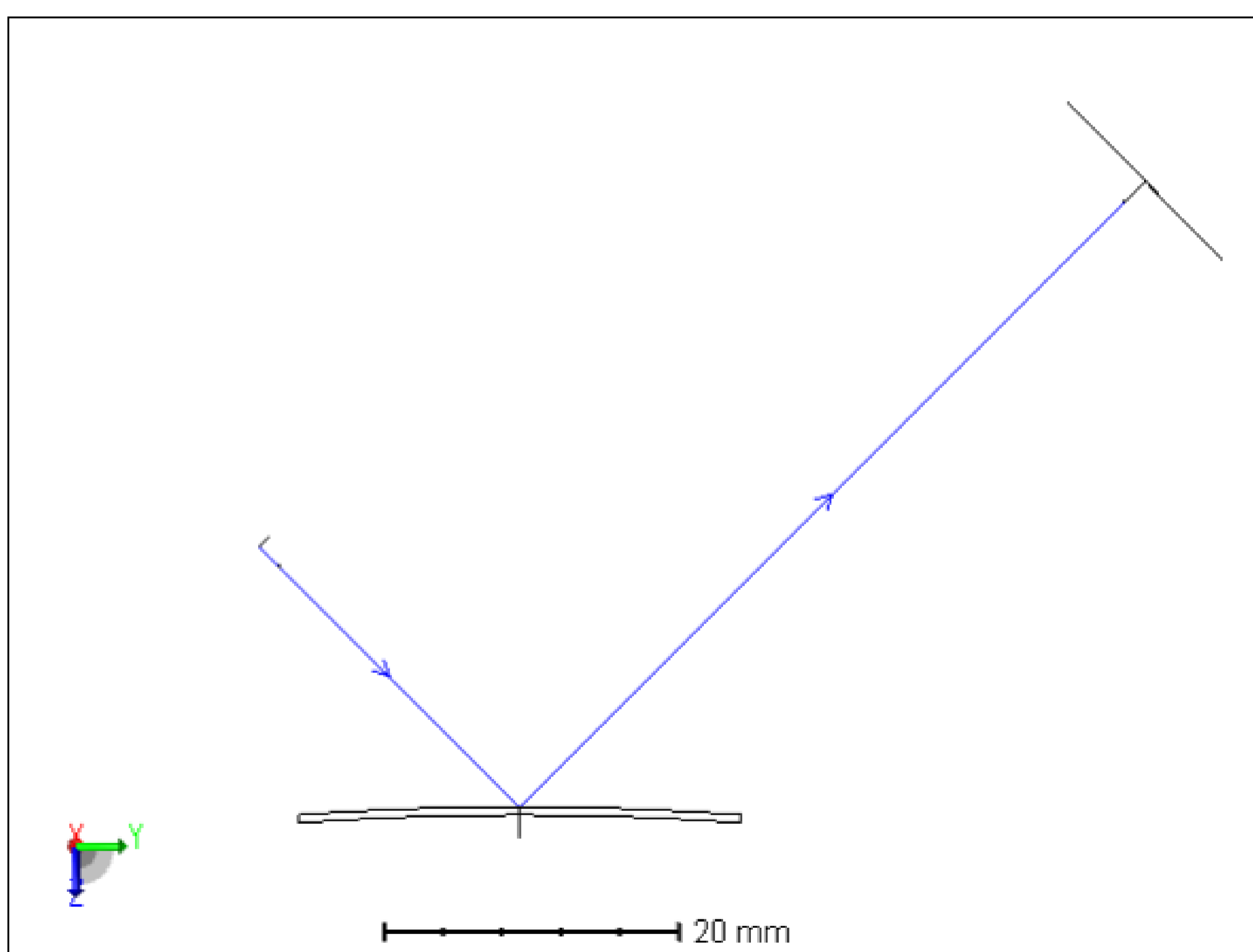


Data processing system

To make the simulation and experimental measurement data easier to compare, the control of both is implemented in one PC. Since the .net-based application cannot parse the gathered data to python directly, they are stored in a database and a python script is started in a separate process to evaluate the measured data. After the evaluation, the result data are also stored in the database. Therewith, the simulation, measurement and result data are all available in the network.

Simulation

The simulation is performed using Zemax Optic Studio³. The simulation performs the same procedure as the experimental measurement.



Web-based result display

To make the simulation data, measurement data and results available for everyone, a web-server has been implemented. Therewith, the data can be displayed and compared from every PC in the network simply using a web-browser.

Conclusion

Covering different functionalities with its preferred programming language in one application, an interface between these languages has to be found. We use a database to transfer data from one functionality to another. Therewith, each functionality can be implemented in its best fitting programming language. Besides this advantage, the data are also stored in a defined structure and are available to others in the network. This could be done using a webserver, providing a data display and comparison or a simple data export. With this, a huge variety of extensions is imaginable.

References

- [1] G. Häusler, G. Schneider, *Testing optics by experimental ray tracing with a lateral effect photodiode*, Appl. Opt. 27 (1988)
- [2] T. Binkele, D. Hilbig, F. Fleischmann, T. Henning, *Measurement of spherical, aspherical and freeform specular surfaces using experimental raytracing in simulation and measurement*, Proc. of SPIE Vol. 10695 (2018)
- [3] Zemax LLC, OpticStudio, Version 16 SP4 Premium

contact:
tobias.binkele@hs-bremen.de

