Optical simulation tools in the OASYS suite and their applications to x-ray optics design

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Since 2013, OASYS (ORange SYnchrotron Suite) has been developed as a versatile, user-friendly and opensource graphical environment for modeling X-ray sources, optical systems, and experiments [1]. Its concept stems from the need of modern software tools to satisfy the demand of performing more and more complex analysis and design of optical systems for 4th generation synchrotron radiation and FEL facilities. The ultimate purpose of OASYS is to integrate in a synergetic way the most powerful calculation engines available to perform virtual experiments in a synchrotron beamline. For X-ray Optics, OASYS integrates different simulation strategies via the implementation of adequate simulation tools (e.g., ray tracing [2] and wave optics packages), which communicate by sending and receiving encapsulated data [3]. The OASYS suite has been extensively used for the EBS and APS-U projects, and several new tools have been created to perform the advanced calculations needed by the optical design of the beamlines and to provide accurate specifications for the procurement of the optics [4-6].

References

[1] Rebuffi L. and Sanchez del Rio M., "OASYS (OrAnge SYnchrotron Suite): an open-source graphical environment for x-ray virtual experiments," Proc. SPIE 10388, 130080S (2017).

[2] Rebuffi L. and Sánchez del Río M., "ShadowOui: A new visual environment for X-ray optics and synchrotron beamline simulations," J. Synchrotron Rad. 23, 1357-1367 (2016).

[3] Rebuffi L. and Sanchez del Rio M., "Interoperability and complementarity of simulation tools for beamline design in the OASYS environment," Proc. SPIE 10388, 1300808 (2017).

[4] Sanchez del Rio M., Celestre R., Glass M., Pirro G., Reyes Herrera J., Barrett R., da Silva J.C., Cloetens P., Shi X. and Rebuffi L., "A hierarchical approach for modeling X-ray beamlines: application to a coherent beamline" J. Synchrotron Rad. 26, 1887-1901 (2019)

[5] Rebuffi L and Shi, X. "Advanced simulation tools in the OASYS suite and their applications to the APS-U optical design," Proc. SPIE 11493, 1149303 (2020)

[6] Rebuffi L, Shi, X., Sanchez del Rio M. and Reininger, R., "A ray-tracing algorithm for ab initio calculation of thermal load in undulator-based synchrotron beamlines". Synchrotron Rad. 27, 1108–1120 (2020).

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