

PhotonMEADOW 2023

Contribution ID: 19

Type: Poster

Wavefront analysis by Shadow raytracing program

X-ray wavefront provides precise information about optics misalignments, optics figure errors, and beam caustics. The knife edge wavefront sensing method is developed recently at Diamond Light Source and used in the wavefront profile reconstruction of focusing elements such as X-ray mirrors and lenses [1]. The wavefront profile is reconstructed from the intensity drop in each pixel of an area detector as the knife edge obscures the rays. We have developed a modelling tool for the knife-edge wavefront sensing method in Shadow [2] under the OASYS interface to simulate and analyse the X-ray wavefront and determine its polynomial compositions. The simulation tool was employed in understanding and interpreting the wavefront data obtained from combined optics consisting of the Alvarez X-ray lens [3] and an elliptical mirror. Unique coordination between the adaptive radius of the Alvarez lens and the incident angle of the elliptical mirror was proposed for reducing the defocus and the lowest-order coma aberrations of combined optics and simulated data were verified with measured data. This paper presents the performance of the wavefront analysis tool in Shadow and its further use in designing the wavefront compensation optics and overcoming the optics misalignments.

References:

- [1] Adaptable refractive correctors for x-ray optics; D.Laundy, V.Dhamgaye, T.Moxham, & K.Sawhney, Optica 6, 1484 (2019)
- [2] OASYS: A software for beamline simulations and synchrotron virtual experiments; M.Sanchez-del Rio, L.Rebuffi, AIP Conf. Proc. 2054, 060081 (2019).
- [3] An Alvarez varifocal X-ray lens; V.Dhamgaye, D.Laundy, H.Khosroabadi, T.Moxham, S.Baldock, O.Fox, & K.Sawhney (Submitted for publication).

Journal of Synchrotron Radiation Special Issue: will you submit your contribution?

yes

Primary authors: Dr KHOSROABADI, Hossein (Diamond Light Source); Dr LAUNDY, David (Diamond Light Source); Dr DHAMGAYE, Vishal (Diamond Light Source); Dr SAWHNEY, Kawal (Diamond Light Source)

Presenter: Dr KHOSROABADI, Hossein (Diamond Light Source)

Session Classification: Poster Session