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The Development of Wavefront Metrology Technique at Beijing Synchrotron Radiation Facility (BSRF)

In this work, we describe an innovative wavefront metrology technique at the first-generation synchrotron radiation source BSRF named Double Edges Scan (DES) wavefront metrology technique. It can achieve high precision measurement of the optical elements used in the fourth-generation synchrotron radiation source. The approach we proposed can resolve several vital problems of the first-generation synchrotron radiation source, including inferior lateral coherence, poor stability, and distortion of incident wavefront. As the lateral coherence has been improved by an order of magnitude, the monochromator crystals used in the fourth-generation synchrotron radiation source need to maintain the wavefront over a large range. By means of the DES wavefront metrology technique, we successfully measured diffraction surface slop error with a precision better than 22.5 nrad (rms). The lateral resolution was 50 microns on the crystal surface. The result proved that we have already realized diffraction limit level wavefront metrology. Currently, the DES measurement has been regarded as an important feedback in the next generation crystal fabrication process.

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

no

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