Evaluation of an Energy Resolution and a Photon Flux of the Optical System of BL-10 by Ray-Tracing Simulation

N. Tsuruoka, H. Iwasaki and T. Yamada*

Abstract

Ray-tracing simulation calculation has been made using a new program RIGTRACE for the x-ray optical system of beamline BL-10 consisting of a pre-focusing toroidal mirror, a double-crystal monochromator and a sample chamber. Ray-propagation diagram has been constructed, which shows the propagation consecutively from the source to the observation plane keeping one by one correspondence through reflections and diffractions by a series of the optical elements. Spot diagrams (cross-sectional images) of the radiation beam at the observation plane have been constructed for rays incident to the monochromator crystal with some degree of divergence and spread in energy and it is shown how the rays differing slightly in energy contribute to the photon flux accepted in the central area in the observation plane. Those diagrams provide information on the energy resolution, $\Delta E/E$, of the system. It has been shown that reduction of the source beam size down to 20 μ m in the vertical direction, possible for the electron storage ring AURORA, enables us to make high resolution spectroscopic measurements without appreciable loss in intensity.

Faculty of Science and Engineering, Ritsumeikan University, Kusatsu, Shiga 525-8577.

**X-ray Research Laboratory, RIGAKU Corporation, Takatsuki, Osaka 569-1146.*