

D32

## **Thermo-mechanical analysis of the white-beam slits for an undulator beamline at the Advanced Photon Source**

H. L. Thomas Nian, T. M. Kuzay, and D. Shu

*Advanced Photon Source, Argonne National Laboratory, Argonne, IL 60439*

Slits are precision devices used on beamlines of the Advanced Photon Source (APS) to trim and shape the incoming x-ray beam before the beam is transmitted to other optical components. At the APS, the insertion devices that generate the x-ray beams are very powerful. For example, the heat flux associated with a x-ray beam generated by undulator A will be on the order of  $220 \text{ W/mm}^2$  at the slit location (about 27.5 m away from the insertion device) at normal incidence. The total power is about 6 kW. Optical slits with micron-level precision are very difficult to design under such heat flux and total power considerations. A two-metal composite slit has been designed to meet the diverse thermal, structural, and precision requirements. A commercial code, ANSYS, has been used as the finite element source for the analysis of the optimized design. A new feature, another code called IMAGE, allows the element (in the ANSYS finite element analysis) when subjected to the x-ray beam, to get the power distribution automatically at its coordinate position.

Analytical calculations for the high heat load/flux precision slits are presented.

This work is supported by the U.S. Department of Energy, BES-Materials Sciences, under contract No. W-31-109-ENG-38.