D26

Commissioning window analyses for the Advanced Photon Source undulator beamlines

Z. B. Wang, T. H. Nian, T. M. Kuzay, and D. Shu
Experimental Facilities Division, Argonne National Laboratory, 9700 South Cass Avenue, Argonne, Illinois

Although the APS undulator beamlines are designed for windowless operation, a commissioning window assembly will be used at the beginning of commissioning of each beamline. Due to the very high total power and power density, the filter/window assembly must be carefully designed to guarantee safe operation during this initial stage. In order to successfully and faithfully analyze the filter/window assembly, first benchmarks have been conducted on analysis methods, modeling, and analysis tools, and then comparisons are made between existing window assemblies and analysis results. This article gives a detailed analysis with different options and arrangements of filter and windows. Different materials, such as graphite (with different thermal conductivities), beryllium, and diamond, are considered here. Important issues, such as thin foil manufacture, variable thickness windows, sublimation of graphite at high temperature in vacuum, oxidation of beryllium at high temperature, the safety margin and safety reserve of ductile materials, buckling of brittle materials, etc., are discussed. Conclusions regarding design and expected performance for the commissioning window for the APS undulator A are presented.

This work was supported by the U.S. Department of Energy, BES-Materials Science, under contract W-31-109-Eng-38.