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A new user-friendly tool for simulating the efficiency of multilayer gratings

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In recent years, several x-ray facilities have begun to use multilayer gratings (MLGs) in plane-grating monochromators thanks to their vastly superior efficiencies in the tender x-ray range compared to traditional single-layer gratings (SLGs). However, most of the software tools normally used for simulating the efficiencies of SLGs are not able to simulate MLGs. As a result several x-ray beamline designers have resorted to purchasing stand-alone proprietary software to calculate the efficiencies of MLGs. However this approach can lead to other complications, especially since many proprietary software packages have been designed with rather different scientific applications in mind.

Here we present a new MATLAB-based software tool being developed at Diamond Light Source (DLS) for simulating the efficiencies of both SLGs and MLGs for x-ray beamlines. At its core our software uses a freely-available program (GD-Calc from KJ Innovation) which calculates grating efficiencies via the Rigorous Coupled Wave Analysis method. Our aim is to provide a user-friendly software tool for simulating grating efficiencies which only requires a MATLAB license. Moreover, as the code is fully-integrated into MATLAB, we believe that our software will help streamline the design optimisation of future SLGs and MLGs. We will present our latest grating efficiency simulations and validate them against complementary simulations using established software such as REFLEC. The existing user interface for the software will be described and we will outline our plans for future software developments. Finally, we will summarise our plans for multilayer gratings at DLS in the context of the Diamond-II upgrade.

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

yes

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