Free-form approach to reconstruct periodic multilayer structure from X-Ray reflectivity.

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The Grazing Incidence X-ray Reflectivity (GIXRR) is a widely used method of investigation of multilayer structures. However conventional model approaches of structural reconstruction from GIXRR are lacking flexibility when dealing with very thin structures, because assumptions have to be made about interface structure. It is almost impossible for these techniques to reliably describe GIXRR of very thin multilayers, for example, La/B-based EUV mirrors. In this work we present custom free-form approach which can solve this task even without constant operator intervention. We demonstrate perfect δ-profile reconstruction and GIXRR curve matching for simulated data, and very good fit of experimental GIXRR for La/B mirror. The uncertainties of structural reconstruction and importance of quality of measurement are also discussed.