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**A Method for Analysing Multiple Scattering in SANS and USANS Data Using Matching Fourier Transforms.** W.K. Bertram, Materials Div., Australian Nuclear Science and Technology Organization, Menai, NSW 2234, Australia

Small-angle neutron scattering (SANS) and ultra-small-angle neutron scattering (USANS) are widely used to investigate the micro- and nano-structures of various materials. However, measurements from many materials such as cement pastes and rocks, are often affected by multiple scattering.

If a substantial number of neutrons experience more than one scattering event within a sample, the result is broadening of the angular distribution profile. Often samples cannot be made thin enough to guarantee single scattering and even in cases where it is possible to make thin samples, surface effects can sometimes lead to results that are not representative of the bulk material. In addition, for many SANS and USANS measurements there is no reliable method for determining whether or not a sample is thin enough to produce predominantly single scattering.

Here we present a new method for extracting singly-scattered data from data affected by multiple scattering. The method is based on matching Fourier transforms. By analyzing the scattering intensities from a number of samples of different thickness, we can obtain values of total coherent elastic scattering cross sections and absorption cross sections on an absolute scale without the need of absolute scaling of the measured data. USANS data can be analyzed without the need for desmearing. One of the advantages of our method is that it allows us to obtain scattering intensities, corrected for multiple scattering, without the need for a model of the scattering form factor which was a feature of the earlier method of Sabine and Bertram (1999).

[1] Sabine T. M. and Bertram W. K., *Acta Cryst. A* **55** (1999), 500-507