Vector Resolution of a Lens-Based SANS Instrument

K.C. Littrell,

NSSD,Oak Ridge National Laboratory, One Bethel Valley Road. Oak Ridge, TN 37831-6393, USA

littrellkc@ornl.gov

The fundamental challenges for small-angle-neutron scattering (SANS) are increasing the useable flux so that good data can be obtained from more weakly-scattering samples, increasing the range of the measured momentum transfer magnitude Q particularly on the low end corresponding to scattering from larger structural components, and measuring the scattering curves with higher resolution so as to better be able to distinguish between competing models for explaining the data or better understand polydispersity. One method for achieving all of these goals is to use lenses focused at the detector as incident collimation. These have already been shown experimentally to simultaneously improve flux on sample, resolution and range for both isotropic and anisotropic scatterers. In this work, the previous results for a functional form for the resolution width for isotropic scatterers are extended to include anisotropic scaterers. As is the case for scalar Q, the contribution of the sample aperture to the resolution function essentially vanishes at the focusing wavelength. Below this wavelength the resolution of a focusing SANS instrument is better than that of a pinhole instrument with the same flight-path lengths and aperture and pixel size.