

Dynamic Diffraction Effects in X-ray and Neutron Stress Analysis

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We present time-of-flight neutron and x-ray diffraction data from thick perfect Si single crystal samples showing dynamic double diffraction effects associated with finite crystal size. In this mode constructive interference occurs solely from thin layers bounded by the front (entry) and back (exit) surfaces of the sample with no scattering originating from the layers in between. This results in two distinct peaks for each reflection. If the instrument resolution is insufficient, these two peaks convolve and cause peak-shape aberrations which can cause significant errors in parameters obtained from diffraction analysis.

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