

An Investigation of the Accuracy of Diffraction Stress Evaluation of Textured Materials

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The determination of residual or applied stress through X-ray or neutron diffraction is generally regarded as a mature method. Most x-ray diffractometers can be used to perform a measurement of lattice strain vs. tilt angle which is then converted into stress. The apparent simplicity of the conversion (the $\sin^2\psi$ law comes to mind) betrays the fact that elastic and plastic anisotropy often cause aberrations of varying magnitude. This investigation focuses on the role of the diffraction elastic constants, the methods of their calculation in the presence of preferred orientation, and the accuracy at which stresses can be determined in the presence of preferred orientation.