

## **A NEW REGULARIZATION METHOD TO DETERMINE STRAIN/STRESS DEPTH PROFILES FROM DIFFRACTION EXPERIMENTS**

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Inverse problems which are involved in x-ray or neutron diffraction analysis are known to be extremely ill-conditioned. The reason is that the linear system of equations which has to be solved for the  $\tau$ - or true depth gradients from the measured  $\tau$ -profiles becomes singular. From the mathematical point of view, regularization methods are recommended to overcome the non-uniqueness of the obtained solution. However, all regularization methods reported in the literature are not suitable to the above problem due to several reasons. Therefore, a new method has been developed. In principle it follows the ideas of the Tikhonov regularization but uses a complete different functional to be minimized. Using a matrix decomposition technique, it is shown that the six independent  $\tau$ -gradients can be separated from a usual measurement series. The true depth profiles are then calculated using orthonormal wavelet basis functions.