Poster Presentation

MS47.P03

Neutron diffraction strain mapping in engineering materials

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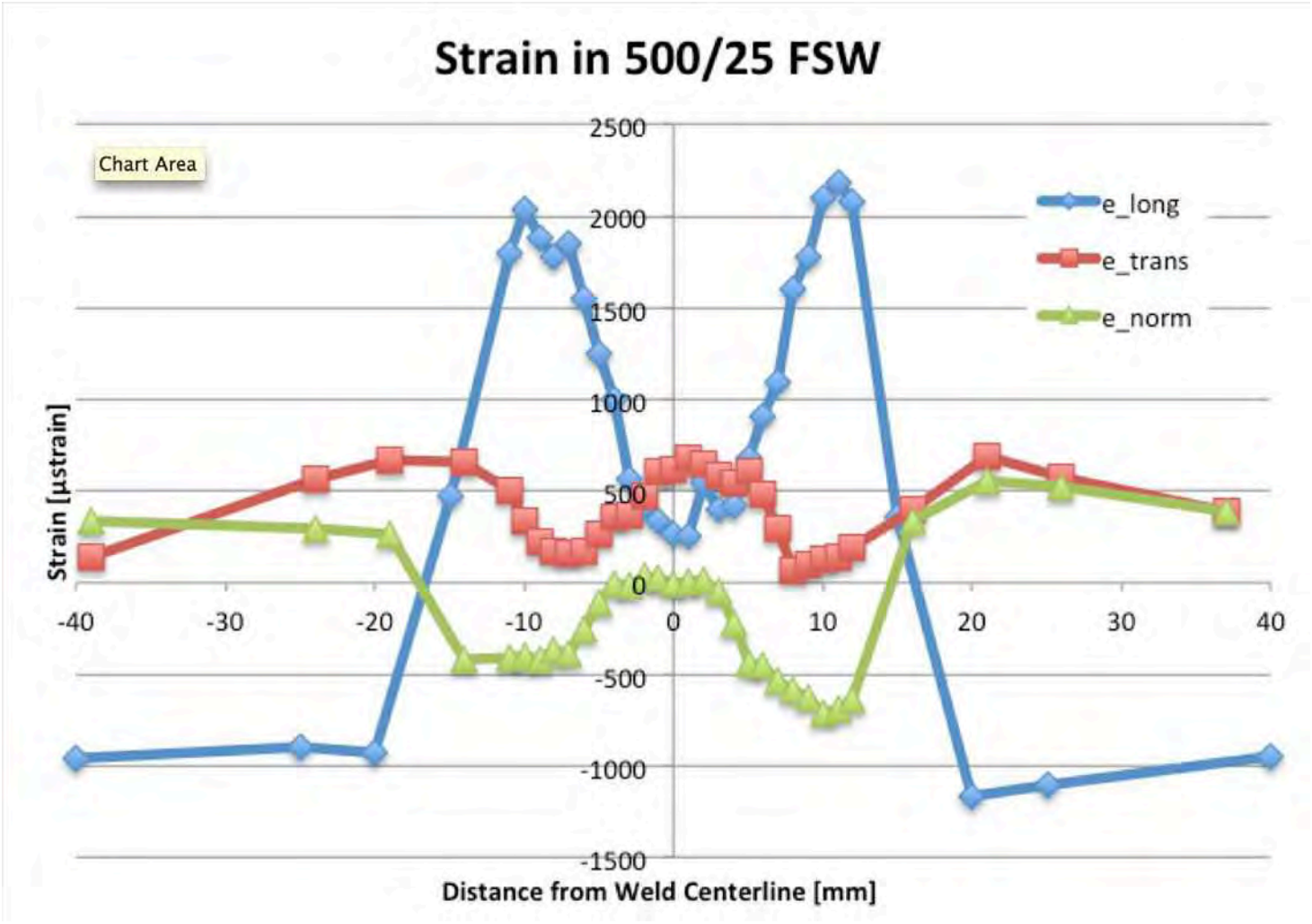
Bragg peak positions with precisions of a few parts in 10^4 are typically necessary to provide the strain resolution required for measurement of the residual strains in bulk materials. Neutron diffraction, mainly because of its high penetration in many engineering materials, provides a unique non-destructive capability for strain measurement. Dedicated instruments for mapping lattice strains using neutron diffraction, a technique first demonstrated in the 1980s, are found at all major neutron scattering facilities around the world. Residual stresses typically arise during synthesis, forming, joining, thermal processing, or use of engineering materials and can significantly impact the strength and performance of the final part. We present two recent examples of strain-mapping experiments conducted at the HB-2B beamline at the High Flux Isotope Reactor. Strain-mapping data collected on a friction stir welded ODS alloy reveals changes in texture and stress resulting from the FSW process, and dependent on the FSW process variables. Mapping experiments on steel conduit intended for the ITER project show the strain distribution from the forming operations, and the partial reduction of these strains through high temperature annealing.



Keywords: residual stress, neutron diffraction