Beitrag ID: **123** Typ: **Poster**

Calibration of the neutron optical path of the engineering materials neutron diffractometer "EMD" at the China Spallation Neutron Source

Dienstag, 17. September 2024 22:40 (20 Minuten)

Calibrating the neutron optical path of EMD is a complicated process. To enhance the measurement accuracy of residual stress, it is required that the neutron beamline, sample stage rotation center axis, and radial collimators'focal points are all focused on the center of the gauge volume defined as the scattering center. Initially, a high-precision laser tracker is used to position the neutron optical components along the path. Subsequently, the neutron beam is used to validate and possibly fine-tune optical components. Finally software calibration aligns ±90° spherical detectors with the scattering center using standard sample. Another critical goal is to minimize the experimental time. EMD employs three neutron slits to optimized the combinations of resolution and integrated peak intensity based on the best figure of merit.
After calibration, the neutron optical path of EMD has been optimized, with a neutron flux of 6×106 n/s/cm² and resolution of 0.3-0.38% @ d-spacing: 0.5-2.6 Å. The determination of the gauge volume center was highly accurate, the deviation of the peak position in the LaB6 diffraction patterns obtained from detectors on both sides after translation to a strain value is only 6 microstrains. After debugging and trial operation for one year, the EMD instrument demonstrates excellent physical performance. Currently, EMD can accurately measure residual stresses in engineering components and conduct in-situ neutron diffraction experiments for both uniaxial and biaxial tension.

Hauptautor: ZHOU, Liang (Institute of High Energy Physics, Chinese Academy of Sciences)

Co-Autoren: Dr. HOFMANN, Michael (Heinz Maier-Leibnitz Zentrum); Dr. LI, Xiaohu (Institute of High Energy Physics, Chinese Academy of Sciences); Dr. GAN, weimin (Helmholtz-Zentrum Hereon)

Sitzung Einordnung: Mounting Posters, Beer and light Dinner

Track Klassifizierung: Instrumentation & Data Management