MM 45 Symposium Tomographic Methods in Materials Research Hauptvortrag Eberhard Lehmann

Zeit: Dienstag 16:30–17:00 Raum: TU H1058

Hauptvortrag

MM 45.1 Di 16:30 TU H1058

Neutron tomography as tool for applied research and technical inspection — •Eberhard H. Lehmann and Peter Vontobel — Paul Scherrer Institut, CH-5232 Villigen PSI

Similar to the imaging with X-ray, neutron imaging systems have been shifted more and more from film exposure towards direct digital detection in the last decade. This approach enables the option for tomography because the image content is measured and understood as dataset now. With the help of mathematical algorithms it becomes possible to derive the necessary information about the full three-dimensional volume from a set of projections from different viewing angles. Neutron tomography with best performance requires a strong and well collimated neutron beam. Such beam lines for either thermal or cold neutrons are available at reactor based sources (FRM-2, HMI, ILL) or at spalltion sources (PSI). The beam geometry for neutrons is in the best case parallel ones, delivering a sharp 1:1 image of the object under investigation. Therefore, the detector resolution is responsible for the tomography resolution generally. In practical reality, objects with outer dimensions up to 40 cm can be inspected with a resolution of 0.1 mm. This compares well with some X-ray tomography systems. However, the application fields are completely different. Neutrons have the advantage to penetrate most metals (especially heavy ones) very efficiently and to detect hydrogenous compounds very sensitively. Therefore, neutron tomography has application fields in moisture detection, test of adhesive connections, structure analysis for soil and geology and the non-invasive investigation of samples from our cultural heritage.