

MM 46 Symposium Tomographic Methods in Materials Research

Zeit: Dienstag 17:00–18:00

Raum: TU H1058

MM 46.1 Di 17:00 TU H1058

Detection of texture alteration in Al parts using Neutron Computed Tomography — ●BURKHARD SCHILLINGER¹, JOHANNES BRUNNER¹, ROLAND GÄHLER², MARTIN MÜHLBAUER¹ und MICHAEL SCHULZ¹ — ¹TU München - FRM-II, 85747 Garching — ²Institut Laue-Langevin, F-38042 Grenoble

Neutron Computed Tomography has been developed to higher and higher sensitivity during the past years. At the research reactor FRM II of Technische Universität München, texture alterations caused by stress in Aluminium parts have been detected for the first time in a large measuring volume using Neutron Computed Tomography. By mechanical deformation, local stress and texture alterations were introduced into Aluminium plates. The altered texture lead to increased small angle scattering, which causes more beam attenuation in large distance between sample and detector. The new method can be used as large-volume pre-examination for quantitative measurements with the Neutron Stress Spectrometer in order to predetermine the areas which should be examined more closely. A Neutron Tomography of a sample of 20 cm size can be measured in about two hours, while a blind scan of the volume on the stress spectrometer may take several days. By preselection of the volumes to be measured, the efficiency of the stress spectrometer can be increased by orders of magnitude.

MM 46.2 Di 17:20 TU H1058

Neutron tomography on fuel cells — ●INGO MANKE^{1,2}, MARKUS STROBL^{1,3}, NIKOLAY KARDJILOV¹, ANDRÉ HILGER¹, JOACHIM SCHOLTA⁴, WERNER LEHNERT⁴, WOLFGANG TREIMER^{1,3}, and JOHN BANHART^{1,2} — ¹Hahn-Meitner-Institut Berlin, Glienicke Str 100, D-14109 Berlin — ²Technische Universität Berlin, Straße der 17.Juni 135, D-10623 Berlin — ³Technische Fachhochschule Berlin, Luxemburger Straße 10, 13353 Berlin — ⁴Zentrum für Sonnenenergie- und Wasserstoff-Forschung, Industriestr. 6, 70565 Stuttgart

Neutrons can penetrate thick metal components while they are very sensitive to hydrogen and other light elements. Therefore neutron imaging can be used as a tool for non-destructive analysis of operating fuel cells. They allow for an analysis of internal cell processes, specifically, the formation and transportation of water throughout the cell. In a low temperature fuel cell (PEMFC) water is produced as a byproduct of the conversion of hydrogen fuel to electrical energy and exists mostly in liquid form as a result of the low operating temperature. However, the development of too much water can disturb the hydrogen/water flow yielding a breakdown in the output power. Thus an efficient water management is very important in the effort to optimize fuel cell energy production. In-situ neutron radiography has been used to investigate the water development in fuel cells applying realistic profiles of power consumption which are, e.g., rapid changes of the power profile (accelerating and breaking in case of an automotive application) and repeated start/shut down cycles as they appear e.g. in portable systems. A special problem is the accumulation of water at the bottom of the fuel cell due to gravity.

MM 46.3 Di 17:40 TU H1058

Neutron radioscopy of a running combustion engine — ●JOHANNES BRUNNER — FRM-II, 85747 Garching, Lichtenbergstr. 1

Dynamic neutron radiography is a non-destructive testing method, which made big steps in the last years. Depending on the neutron flux, the object and the detector a time resolution down to a few milliseconds is possible. In the case of repetitive processes the object can be synchronized with the detector and better statistics in the image can be reached by adding radiographies of the same phase. By delaying the trigger signal a radiography movie can be composed with a time resolution down to 100 μ s. A combustion engine is an ideal sample for the explained technique, because the motor block of metal is relatively easy to penetrate, while oil and fuel attenuate the thermal neutron beam much stronger. After various experiments at ILL and PSI the first measurements at the new neutron source FRM-II started.