Contribution ID: **107** Type: **not specified**

Energy-selective neutron imaging: methods and applications

Monday, 16 April 2012 15:33 (3 minutes)

Neutron radiography and its extension to tomography is based on transmission contrast by varying macroscopic cross sections in the sample of interest. Traditionally, a polychromatic beam is used, which enables to discriminate between different sample materials and thicknesses.

By using a tunable monochromatic, cold neutron beam one can scan in transmission polycrystalline samples over the cold energy range, where so-called Bragg edges dominate the cross section. Those edges can be understood in the context of the Bragg law 2dhklsin(θhkl)=λ, where coherent elastic scattering at the hkl lattice plain is possible until 2dhkl=λ, after which a sharp increase in transmission intensity is observed because of decreased sample scattering out of the beam. In energy selective neutron imaging around these Bragg edges lays a new source of image contrast that contains microstructural information on the sample. It has the potential of becoming a new tool for material research complementary to existing diffraction techniques. The approach can also be extended to 3D tomography studies on request.

A first part of this poster is dedicated to a study on the use of two monochromator types for energy selective imaging: the neutron velocity selector and a newly developed monochromator called TESI. The first features a large field-of-view and a monochromaticity Δλ/λ=15% realized through mechanical selection of the desired neutron energies. TESI uses a set of single crystals to scatter neutrons of unwanted energies out of the direct beam, to obtain a final monochromaticity of Δλ/λ=2%-5%.
The second part of the poster deals with applications of energy-selective neutron imaging, with special focus on the combination with neutron diffraction imaging.

Primary author: Mr PEETERMANS, Steven (Paul Scherrer Institut)

Co-authors: Dr LEHMANN, Eberhard (Paul Scherrer Institut); Ms JOSIC, Lidija (Paul Scherrer Institut)

Presenter: Mr PEETERMANS, Steven (Paul Scherrer Institut)

Session Classification: Short presentations (Poster session)