Contribution ID: **24** Type: **not specified**

Neutron imaging –an ideal tool for the observation of processes involving low density elements

Tuesday 10 January 2017 11:50 (20 minutes)

Many dynamic processes have active components consisting of mainly low density elements like hydrogen or lithium. Neutron imaging has the characteristic feature that the modality is very sensitive to in particular these elements. This is used to observe processes in applications like porous media research (soil hydrology, geology, and civil engineering), foams (food and polymers) and electrochemistry (batteries and fuel cells). The neutron flux is the main limiting factor for the speed of the observed processes. Different acquisition strategies are successfully used depending on the process speed. The strategies ranges from steady state observations, golden ratio, and on-the-fly. Each method with increasing acquisition rate and decreasing signal to noise ratio. Speeding up the acquisition rate often also mean reducing the number of projections. This has led to the development of reconstruction techniques that successfully utilize the time structure in the data for the regularization to improve image quality. The next step is the analysis and quantification of the time series of CT data. The nature of the experiments varies therefore different analysis strategies have to be developed.

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Session Classification: Contributed talks Tuesday I

Track Classification: Lectures