Contribution ID: **25** Type: **not specified**

Iterative reconstruction and three-phase segmentation of low-contrast undersampled time-lapse X-ray synchrotron data

Monday, January 9, 2017 3:40 PM (20 minutes)

Technological advances in tomographic acquisition speeds allow multiple 3D data to be acquired in a short period of time, meaning that the structural changes of an object can be interpreted as a function of time. Dynamic experiments are crucial since they can shed a light on structural changes under realistic conditions. The critical limitation of dynamic imaging is a number of projections required per scan. While reducing the angular density of projections increases scans frequency (with less incorporated motion per time-frame), reconstruction from undersampled data poses major difficulties related to mathematical ill-posedness of inversion. Iterative image reconstruction (IIR) methods are much better adapted to deal with ill-posed inversion from undersampled measurements than direct methods as they use error-correcting refinements in iterations and allow the use of a priori information.
In order to demonstrate the possibilities of IIR for time-lapse data we will show a challenging case of reconstructing undersampled low-contrast dynamic data of ice-cream. The temperature of a sample changes during the experiment which leads to various structural deformations and interesting physical phenomena to occur. Although IIR reconstruction significantly improves contrast and SNR of images, segmentation of three-phase material (air, ice-crystals, ice-matrix) remains a challenge. We will present a novel post-processing approach to tackle the problem of varying intensities within one-phase region which impedes successful segmentation.

Primary author: Dr KAZANTSEV, Daniil (The University of Manchester)

Co-authors: Dr KAESTNER, Anders (Paul Scherrer Institut, NIAG); Dr GUO, Enyu (The University of Manchester); Prof. LEE, Peter (The University of Manchester)

Presenter: Dr KAZANTSEV, Daniil (The University of Manchester)

Session Classification: Contributed talks Monday

Track Classification: Lectures