Contribution ID: **66** Type: **not specified**

The effect of rotation speed in tomography acquisition on the reconstruction artifacts

Thanks to the ultra-fast endstation of the TOMCAT beamline, it is possible to do a tomographic scan with a sub-second temporal resolution which allows following dynamic processes in 4D (3D space + time). This ultra-high-rate tomography acquisition, exploiting the distinctive peculiarities of synchrotron radiation, provides nondestructive investigation of many dynamic processes which were not possible in the past. For example a continuous tensile test has been conducted recently in-situ for the first time with a frequency of 20 tomograms per second (20 Hz acquisition frequency). In the ultra-fast endstation a scintillator is used to convert X-ray to visible photons that can be detected by the camera. However, this conversion is not ideal and the scintillator decays exponentially with afterglow. Afterglow can cause resolution degradation and artifacts (such as ring and band) especially with high rotation speed. On the other hand, to achieve a higher scan speed, thicker scintillators are more common because they result in higher emission intensities that can compensate the short exposure time in fast scans. However, the resolution deteriorates as the scintillator's thickness increases and thicker scintillators show higher afterglow. Performing many ultra-fast scans at the TOMCAT beamline with different acquisition rate, we demonstrate how the rotation speed effects on the projection data and reconstructed images. Using two different thicknesses of LAG scintillator we also investigate the afterglow artifacts for different acquisition rate and exposure time. Developing a realistic model for afterglow we propose a correction method to remove afterglow from the projections which result in a reconstruction free of afterglow artifacts.

Primary author: ZAREI ZEFREH, Karim (Universiteit Antwerpen)

Co-author: Prof. SIJBERS, Jan (University of Antwerp)

Presenter: ZAREI ZEFREH, Karim (Universiteit Antwerpen)