ANKAPHASE: SOFTWARE FOR SINGLE-DISTANCE PHASE RETRIEVAL OF INLINE PHASE CONTRAST IMAGES

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Propagation-based, or "inline", X-ray phase contrast is widely used in synchrotron microtomography. It combines the high spatial resolution of synchrotron-radiation radiography with the enhanced density resolution of phase-sensitive X-ray imaging methods. Moreover, the setup is relatively simple.

However, while inline phase contrast images can often be directly used for visual inspection, any further quantitative analysis that requires segmentation of the volume data is not easily possible using the plain phase-contrast data. In these cases, a phase retrieval algorithm must be applied to the transmission radiographs to obtain area contrast in the tomograms.

Excellent phase retrieval routines exist, for example the holotomography approach (Cloetens et al. 1999: Appl. Phys. Lett. 75, 2912). Unfortunately, they often require data recorded at different distances between sample and detector. This precludes their application in cases where acquisition time is a critical issue, for example in solidification studies or when sample throughput needs to be optimized.

Phase-retrieval algorithms based on a single distance have been developed in the past, but not all of them can deal with samples that show non-negligible absorption. One approach that can solve this problem for a large class of samples was reported in 2002 by Paganin et al. (J. Microsc. 206, 33).

In our poster we present a computer program named ANKAphase that implements this algorithm (Weitkamp et al. 2011: J. Synchrot. Rad. 18, 617). ANKAphase processes stacks of images, on which it optionally performs flatfield normalization and subtraction of dark images. It is adapted for the processing of tomography data sets (although it does not perform tomography reconstruction itself). A graphical user interface makes it accessible to non-experts. It is written in Java, runs on most computer platforms, either as a standalone application or as a plugin to the widely-used image viewing/processing program ImageJ.