KCT CBCT: Fast, Accurate, and Reliable Software for Algebraic CT Reconstruction

Monday 23 September 2024 16:00 (20 minutes)

KCT CBCT is a high-performance software suite designed to tackle the inverse problem of tomographic reconstruction, specifically for CT and CBCT applications. This package offers a range of modern reconstruction algorithms, including Krylov-based LSQR and CGLS methods, as well as the widely used OS-SIRT technique. A key innovation of KCT CBCT is its implementation of the Cutting Voxel Projector (CVP), an algorithm developed by the author that directly computes voxel projections using volume integrals, significantly enhancing projector precision. The package also supports other projectors, such as the TT and Siddon projectors, with future updates planned for DD and TR projectors. In addition to these core features, KCT CBCT includes basic L2 regularization and preconditioning schemes for Krylov methods. Looking ahead, there are plans to implement advanced nonlinear regularization techniques, such as Total Variation (TV) regularization. The programs are written in C++ and OpenCL. Optimized for GPU acceleration, KCT CBCT is compatible with both AMD and NVIDIA architectures, utilizing OpenCL 1.2 for broad hardware support. Notably, the software fully supports parallel ray geometry, making it particularly suited for synchrotron applications.

Primary author: KULVAIT, Vojtech (Hereon (Helmholtz-Zentrum Hereon)) **Presenter:** KULVAIT, Vojtech (Hereon (Helmholtz-Zentrum Hereon))