

## AbstractID: 1081 Title: An Adaptive Algebraic Reconstruction Technique

Algebraic reconstruction techniques (ART) are iterative procedures for reconstructing objects from their projections. It has been pointed out that ART can be improved by: 1) carefully choosing the data-access ordering, 2) adaptive adjusting the relaxation parameters, and 3) incorporating available *a priori* knowledge. In this study, a novel adaptive image reconstruction technique, namely AART, is proposed. In AART, the above three aspects are considered. At first, the same projection access scheme in MLS-ART is adopted by AART. Furthermore, a data-driven adjustment of relaxation parameters and maximum amplitude constraints (MAC) are applied during the reconstruction procedure. In other word, the relaxation parameters are adjusted and MAC are generated according to the observed data adaptively. It is shown that MAC also automatically provides the boundary information of the objects, which is very important for ART. Comparisons are made between our method, Radon transform (RT) and MLS-ART by applying these three methods on the Shepp-Logan phantom and real medical images. The results show that AART outperforms the other two methods in all experiments. Three major benefits are achieved by AART: higher-quality reconstruction, faster convergence and less artifacts. One-iteration AART outperforms RT and one-iteration MLS-ART in both complete-views and limited-views cases. In comparison with MLS-ART, AART converges fast about a factor of 15 averagely in our experiments. And the artifact noises are almost disappeared in the area outside the boundary given by MAC in the reconstructions obtained by AART. In summary, simulation data show the effectiveness of the proposed image reconstruction method.