AbstractID: 1198 Title: Tomographic reconstruction from projections of displaced center for radiotherapy applications using MLS-ART

Cone beam CT reconstruction from projections of displaced center was performed using an amorphous silicon-imaging device for large volume CT imaging. This approach has important applications in radiotherapy including both simulation and treatment verification using the flat-panel aSi detector. The reason is that the current device cannot cover the whole patient body, especially with extended source to detector distance (SDD). However, these devices allow the center to be displaced such that at least half of the patient can be imaged and therefore CT reconstructed. In this study, we used the MLS-ART technique for image reconstruction. This algorithm not only provides better image quality given a limited number of projections, but it needs no data pre-processing for projections of displaced center as the standard techniques like the Feldkamp algorithm does. The total reconstruction time for one-iteration MLS-ART is similar to the standard algorithms. We performed the reconstruction using scans covering 360 degree. In image reconstruction, we used only the projection data on one side of the rotation center by ignoring the other incomplete half (equivalent to using half projections.) For fast convergence, we bundle the pair of opposed half projections as a single step in the multilevel scheme (MLS) sequence (i.e., 0, 180; 90, 270; 45; 225; 135; 315...). The results demonstrate that CT reconstructions with displaced center can produce as good image quality as that from full projections, as long as the amount of projection data is the same.