AbstractID: 5901 Title: A novel approach for metal artifacts reduction due to tooth filling

Introduction: The aim of this study is to present a conceptually new method for metal artifact reduction (MAR), especially for patients who have multiple metal objects with small sizes. Metallic implants such as dental fillings cause serious artifacts in reconstructed CT images. Although the previous methods based on conventional projection-interpolation successfully reduced artifacts in the case of large metal objects such as hip prostheses, their performance appears to depend highly on the complexity of the structures examined and they are very sensitive in correctly detection of missing projections resulting still many artifacts in the final reconstruction for the case of multiple-near metal objects.

Methods and Materials: The proposed method is based on modifying the raw CT data acquired during patient's examination. First, the projection data affected by metal objects (missing projections) are detected in sinogram using a simple thresholding algorithm. Then, the missing projections are replaced by corresponding 180 degrees projections, which are not affected by metal objects. The idea beyond the replacing scheme is due to the fact that the two projections along the same path but in the opposite sides would be the same in the absence of table motion. So, in the presence of table motion, like an helical CT exam, the opposite side projections still constitute very good approximations for the corresponding missing projections. In order to make the replacing scheme more reliable, we start the process simultaneously from each side of missing projections area. Finally, the modified sinogram is transferred back to the CT scanner device where CT slices are regenerated using the built-in reconstruction operator.

Experimental Results: The resulting tomography by the proposed approach show significant improvements in image quality, especially for regions near the metallic implants, compared to those by interpolation-based approaches.