

Simulation of CT metal artefacts in C

Alexander Winkler
Chair for Computer Aided Medical Procedures & Augmented Reality 2014
Technische Universität München
alexander.winkler@mytum.de

ABSTRACT

Keywords

CT, metal artefacts, simulation, segmentation, forward projection, X-Ray tube

1. INTRODUCTION

2. CAUSES OF METAL ARTEFACTS IN CT

2.1 Fundamentals of X-Ray physics

2.1.1 *Beam hardening*

non-linear relation between the attenuation values, μ , and the measured values of the projection due to the fact that different bands of the frequency spectrum are differently attenuated soft X-ray beams, are more strongly absorbed than the high-energy, hard X-ray beams. This is the reason why this effect is named hardening of the X-ray spectrum and the corresponding image error is named beam-hardening artefact.

2.2 Fundamentals of CT reconstruction

3. SIMULATION OF CT

3.1 Forward Projection

3.1.1 *Overview over the forward projection*

3.1.2 *Implementation of line integrals*

3.1.3 *Implementation of beam hardening*

3.2 Back Projection

3.3 Parts of the simulator

3.3.1 *Segmented CT slice*

3.3.2 *Simulation of X-Ray tube*

3.3.3 *Look up tables for attenuation values*

4. RESULTS

5. CONCLUSION