Assessing the Effect of Focal Spot Movement on the Accuracy of CT Results by using a Simulation Technique

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Abstract
As Weiss et. al. demonstrated [1] the movement of the focal spot of a microfocus X-ray source during the CT scan significantly influences the results of the CT scan and of dimensional measurements derived from such a scan. Fröba et. al. [2] showed the effects of thermal extension and summarized the requirements for microfocus X-ray tubes used in long term CT scan.
In this paper the focal spot movement of an X-ray source with a newly developed internal cooling is discussed. Furthermore the results are compared with previous results [4] obtained with an external cooling module.
To analyse the net effect of controlling the focal spot movement a simulation study is performed. It starts with the simulation of projections by using the aRTist software of German BAM. In the next step the new TomoSynth software allows to simulate the movement of the focal spot during the scan. This software was recently introduced by Bellon et. al. [3]. The reconstructed CT volumes obtained from different behaviours of the focal spot during the CT-scan are compared and visualized.

Keywords: Dimensional Measurement, Microfocus X-ray Source, X-ray Source Stability, High Resolution Computed Tomography

References