

Evaluation of Changes in Image Contrast Due to Different Energy Weightings of X-ray by Simplification of Imaging Systems

Saturday, 13 November 2021 10:15 (15 minutes)

In recent, the advent of the photon-counting detector has improved the flexibility of weighting of X-ray energy within each energy region in X-ray imaging, and this enabled to improve the quality of X-ray images and to emphasize the region of interest.

On the other hand, since the changes in the contrast of the overall image is important factor in the situation that human evaluate images visually, it is necessary to predict and evaluate the entire changes of the image contrast caused by the weighting of X-ray energy in order to apply the X-ray energy weighting techniques to such situations.

A conceivable approach to evaluate this is to simulate or formulate the imaging system. However, it is not practical to construct the geometry and simulate each time the target object changes, and the interaction between X-rays and the objects is too complex to be formulated.

In this study, we simplified the imaging system to represent the changes in the image due to the difference in the weighting of X-ray energy as tone curves which used in conventional image processing, and predicted and evaluated these changes.

Images of the same object taken using two detectors with different X-ray energy weightings were compared with those transformed using the respective tone curves obtained by simplified imaging systems, and the results showed that the tendency of image changes due to energy weightings can be predicted by tone curves. The results of this study will contribute to the prediction of the changes in images when energy weighting techniques are applied to situations where visual evaluation is required.

Topics

Session C. Applied optics and engineering

Primary authors: HOTTA, Takumi; Dr TAKAGI, Katsuyuki (Shizuoka University); GOTO, Takeru (Faculty of Informatics); Mr KOIKE, Akifumi (ANSeeN Inc.); Dr IMURA, Yukino (Shizuoka University); AOKI, Toru (Shizuoka University)

Presenter: HOTTA, Takumi

Session Classification: Saturday Session