Contribution ID: **112** Type: **Poster presentation**

Detective quantum efficiency of photon-counting detectors having edge-on geometry under mammography imaging condition

Tuesday, 5 July 2011 15:19 (1 minute)

We analyze the imaging performances of the microstrip silicon detector operated in counting mode under mammography imaging condition. Although the detector has an asymmetric pixel size of about 100 (width) by 500 (height) microns, the 100-micron slit aperture of the beam collimator shapes a practical symmetric pixel pitch of 100 microns. Since the detector is composed of four separate linear array modules and each module has 256 microstrip designs, the whole image size can be covered over 10 cm times the scan length. The detector has edge-on geometry with an angle of 5 degrees to the normal direction of x-ray incidence. Using a slanted-edge knife technique, the modulation-transfer function (MTF) without aliasing is determined. Noise-power spectrum (NPS) is determined using two-dimensional Fourier analysis on the scanned images. Based on the measured MTF and NPS results, detective quantum efficiency (DQE) is calculated. This systematic procedure is applied to the various thresholding operations in the detector. Asymmetric MTF properties between two perpendicular directions are observed and the noise-power spectral densities are white for spatial frequencies. The best DQE around zero-spatial frequency is greater than 0.8, which is still less than the theoretical limit, is achieved. The measured imaging performances are analyzed by a combination of cascaded linear-systems theory and Monte Carlo simulation in detail and compared with those of conventional charge-integrating detectors.

Primary author: Mr YUN, Seungman (Pusan National University)

Co-authors: KANG, Dong-Goo (Samsung Advanced Institute of Technology); Mr YOUN, Hanbean (Pusan National University); Prof. KIM, Ho Kyung (Pusan National University); PARK, Jae Chul (Samsung Advanced Institute of Technology); Ms JOE, Okla (Pusan National University); KIM, Sangwook (Samsung Advanced Institute of Technology); SUNG, Young-Hun (Samsung Advanced Institute of Technology)

Presenter: Mr YUN, Seungman (Pusan National University)

Session Classification: Poster Mini Talks VI

Track Classification: Applications