

Experimental study of the application feasibility of a-Si FPD for flash x-ray radiography

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Abstract

Imaging system is very important for x-ray radiography. It can make obviously effect on the image quality and measurement precision. At '97 RSNA conference, a new imaging system amorphous silicon flat panel detector (a-Si FPD) had been introduced. An a-si FPD consists of detector, monitor, PC, electric cable, optic fibre, imaging card, and image processing software, and so on. A-Si FPD has several advantages such as high sensitivity, good linear performance, directly digitized. A-Si FPD has been used widely for continuous x-ray radiography in NDT and medical imaging area. A large number of articles have been published which involve applications and performance of a-Si FPD.

Although a-Si FPD has proven to be quick and efficient for producing high quality digital images for continuous x-ray radiography, it has not been reported about the application feasibility of a-Si FPD in flash (from several to tens nanoseconds) x-ray radiography. In this paper, an a-Si FPD (Varian PaxScan 2520 HE) was used as imaging system in 450keV flash x-ray radiography to investigate the application feasibility. The detecting sensitivity was evaluated by step method. Imaging Quality Index (IQI) sensitivity was measured. Line spread function (LSF) and modulation transfer function (MTF) were acquired by knife-edge method and Fourier transform. The results demonstrated that a-Si FPD is an attractive detector for flash x-ray radiography with quality images. Under the concerning conditions, the minimum dose can be imaged is down to 0.1mR, the IQI sensitivity is about 5%, the FWHM of the LSF is about 0.4mm, and the MTF for 3.5lp/mm is about 10%. Several screen/film combinations were also measured in the same conditions, and compared with the a-Si FPD.

Key words: a-Si FPD; flash x-ray radiography; feasibility; performance; experimental study