AbstractID: 5012 Title: A method of the pixelized detectors coordinate resolution and MTF estimation

Purpose: We propose a simple method to estimate MTF and coordinate resolution of pixelized detectors used in digital imaging systems.

Method and materials: The traditional determination of coordinate resolution for pixelized detectors is mainly based on the use of line spread function measurements. The proposed method is based on the determination of the statistical correlation between neighbour elements in the detector. The correlation is evaluated by means of statistical noise measurement of the isolated elements and the linear combination of neighbour elements. To suppress the possible contribution of the beam spatial variation, the difference between values of neighbour elements is used. The distribution of differences between the detector neighbour pixels is constructed for the pixels sharing an edge (either in X or Y directions), or having one common vertex (U or V). For the validation of the method, we have studied the GE Senographe 2000D mammography unit digital detector. The detector has been irradiated by X-rays across its entire surface. The dependence of the resolution on the photon intensity value and the pixel coordinate has been studied. The resolution function has been considered as a result of convolution of Gaussian and uniform distributions.

Results: The coordinate resolution of the studied detector, having pixel size of 100 μ, is of the order of 50 -55 μ, that is, almost twice the value conditioned by pixel geometrical size. A small asymmetry between the X and Y directions has been detected. The reconstructed modulation transfer function agrees with MTF measurements of the studied detector, within a few percent.

Conclusion: The proposed method can be useful for the estimation of coordinate resolution, line spread function and modulation transfer function of the detectors used in the systems of medical digital imaging.