

AbstractID: 5079 Title: A mechanical alignment method for removing moiré pattern in digital radiography with a carbon-interspaced grid

Purpose: To remove moiré patterns of a carbon-interspaced X-ray anti-scatter grid in use with a digital radiographic detector by matching a grid line frequency with a DR sampling frequency

Method and Materials: A carbon interspaced grid with a line frequency a little higher than the sampling frequency of DR was processed by a sawing machine which was controlled as micro unit. An amorphous selenium DR panel was used in imaging. A motion-control jig was developed to change the disposition of the grid with respect to the detector pixels. An alignment process was divided into horizontal and vertical directions. The detector underneath of the X-ray grid was translated and rotated with the resolution of 2 microns and 0.01 degrees respectively so that the pattern lines were oriented perpendicular to a horizontal axis in an image plane. A height of the grid from the detector was varied by 4 micrometers to magnify the shades of the grid lines at the detector and, hence, to exactly match with the sampling frequency of the detector.

Results: A moiré frequency was proportional to a difference between the grid shade frequency and the DR sampling frequency. An angular displacement of the detector caused a frequency difference to indicate a higher frequency of moiré. The horizontal translation did not change the moiré frequency but only phases. An impact of the phase shift on image became larger at lower frequency of moiré patterns.

Conclusion: A Moiré pattern in the use of a fixed type of grid can be removed by matching a grid line frequency with a DR sampling frequency. High straightness and uniformity of grid lines of carbon-interspaced grids and micro-controlled alignment methods enable frequency matching to remove moiré patterns without a software filtering and a moving grid.