AbstractID: 11448 Title: Depth of Field in Radiography

Purpose: Depth of field (DoF) is a well developed concept in photography. Several recent advances in photography have capitalized on DoF to optimize the information that can be extracted from images. This study explores an analogous concept to DoF in radiography and its implications.**Method and Materials:***Hypothesis 1:* Given an X-ray source with a finite focal spot size and a detector with a known pixel size, objects appear sharpest when placed at the point of intersection of the lines joining the opposite ends of the width of the source and that of the central pixel. A fixed source to detector distance of 1560mm was selected. A tilted lead sheet was then imaged at a number of locations between the source and the detector, and the spatial frequency (mm^{-1}) at 50% MTF was reported for each of these locations. *Hypothesis 2:* It is possible to disambiguate between layers within a patient by moving the source and/or the detector along the source-detector axis. A foam block with two perforated aluminum sheets attached on opposite sides was imaged. These sheets are representative of different imaging planes within a patient. A second image of this block was acquired using a source position further away from the detector. The acquired images were then merged using knowledge of the geometrical transform and the imaging plane of interest to sharpen one of the two sheets and blur out the other. **Results:**Structures with size of the order of the pixel pitch of the detector can best be resolved at the DoF. Using the proposed technique, it is possible to selectively sharpen layers of interest within a patient. **Conclusion:**An understanding of the DoF can facilitate expansion of the DoF allowing more planes within a patient to be imaged sharply(“focused”).Moreover, it can allow focusing at desired depths within a patient.