

Image Intensifier (II) distortion changes with C-arm rotation because of changes in the orientation of the II with the earth's or other stray magnetic fields. For cone-beam computed tomography, distortion correction for all angles is essential. The new super-global distortion correction consists of a model to continuously correct II distortion not only at each location in the image but for every rotational angle of the C-arm. Calibration images of a planar phantom with 169 copper beads arranged on a square lattice were acquired as 1024×1024×10 bit matrices with a Toshiba CAS-10A. First, for each view at every 10°, a global distortion correction was modeled with a 5th order polynomial fit of the difference between distorted and actual bead locations. Next, these polynomial fitting parameters were each fit to a 7th order polynomial as a function of rotational angle to obtain a super-global model. The residual root mean square (RMS) error between the corrected and actual bead positions was 0.185 pixels with the single-plane global fit, compared to 0.204 pixels with the super-global fit. A 10° angular increment for the calibration images was found to be adequate since the super-global correction was a slowly varying function of angle. The super-global model has slightly less accuracy than the single-plane global fit. However, corrections for intermediate angles can be readily calculated from the model without measurement at every required angle.

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