

## AbstractID: 5511 Title: Two-dimensional Shift-And-Add (SAA) Algorithm for Digital Breast Tomosynthesis Reconstruction

**Purpose:** To investigate a two-dimensional Shift-And-Add algorithm for three-dimensional digital breast tomosynthesis reconstruction to correct for defects existing in the traditional Shift-And-Add algorithm that calculates only one-dimensional shift amount along the axis of x-ray tube's motion.

**Method and Materials:** With the traditional Shift-And-Add (SAA) algorithm for breast tomosynthesis reconstruction, shift amounts for each projection plane are calculated only along the axis of x-ray tube's movement. As a result, small objects such as microcalcifications appear slightly blurred in the direction perpendicular to the direction of tube motion. In this project, a two-dimensional SAA method was developed to correct for this phenomenon. Shift amounts for every pixel location on each reconstruction plane were computed, taking into account the 2D arc projection location of reconstructed objects in each plane. Bilinear interpolation was used for partial pixel locations. Impulses at different 3-D locations were simulated and a few human subject tomosynthesis sequences were acquired for investigation.

**Results:** Two-dimensional SAA demonstrated the improvement in the direction that is perpendicular to the tube motion direction. For human subjects, the appearance of calcifications from 2D SAA was sharper than traditional SAA at the direction orthogonal to the tube motion direction. The out-of-plane artifacts of calcifications changed from curved to be straight.

**Conclusion:** Two-dimensional SAA is an effective method to reconstruct 3D tomosynthesis images of the breast. Compared with the traditional SAA, the new method corrects for 2D shift amounts coming from the isocentric tube motion. This provides more accurate and reliable results compared with other SAA algorithms.

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