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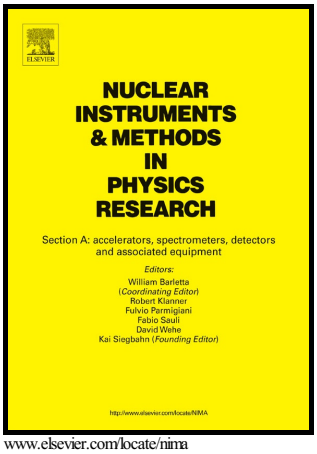

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Dual energy subtraction method for breast calcification imaging

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Abstract

The aim of this work was to present an experimental dual energy (DE) method for the visualization of microcalcifications (μCs). A modified radiographic X-ray tube combined with a high resolution complementary metal-oxide-semiconductor (CMOS) active pixel sensor (APS) X-ray detector was used. A 40/70 kV spectral combination was filtered with 100 μm cadmium (Cd) and 1000 μm copper (Cu) for the low/high-energy combination. Homogenous and inhomogeneous breast phantoms and two calcification phantoms were constructed with various calcification thicknesses, ranging from 16 to 152 μm. Contrast-to-noise ratio (CNR) was calculated from the DE subtracted images for various entrance surface doses. A calcification thickness of 152 μm was visible, with mean glandular doses (MGD) in the acceptable levels (below 3 mGy). Additional post-processing on the DE images of the inhomogeneous breast phantom resulted in a minimum visible calcification thickness of 93 μm (MGD=1.62 mGy). The proposed DE method could potentially improve calcification visibility in DE breast calcification imaging.