

## **Effects of kVp on MTF for Dual-Energy Digital Mammography Using a CCD Based Detector**

We are currently in the process of developing a dual-energy subtraction imaging technique for a small field CCD based digital mammography system. The technique involves acquiring two images with low- and high-energy x-ray spectra. In this paper, we attempt to measure and study the effect of x-ray spectra on the modulation transfer function (MTF) during dual-energy image acquisition. A simple model was developed to compute and compare the MTFs for images obtained with various x-ray spectra for both CCD and screen/film based systems. The model was based on computation of x-ray absorption at various depth levels in a typical screen used in both screen/film and CCD based mammographic systems. Because x-rays enter the screen on the opposite side of the CCD, the images produced are intrinsically less sharp than those from a screen/film combination. However, in contrast to the case of screen/film imaging, an increase in kVp would actually improve the MTF with a CCD based digital mammography system. Pre-sampled MTFs were measured using the tilted slit method to verify the predictions from the modeling study. A slight increase of the MTF was observed when higher x-ray spectra were used. In this paper, results from the modeling and experimental studies will be presented to discuss the effects of x-ray spectra on the MTF in dual-energy digital mammography.