

In this talk, we will review current developments and research topics in liquid-crystal medical display (LCMD) devices including viewing angle, pixel density and sub-pixel noise. We will discuss in detail the non-Lambertian nature of the LCMD angular emission. We will use this particular aspect of display image quality to develop a comprehensive framework that includes physical measurements, modeling, and observer studies. Within this framework we will identify some methods to quantify image quality. First we will present experimental results from our laboratory that demonstrates that angular luminance measurement methods can differ by as much as 38%. Second, we will address the debate medical-versus non-medical-grade displays with respect to their angular emission characteristics and present angular luminance measurements for a variety of LCMDs and consumer-grade displays including systems with 0.8, 1.3, 2, 3, 5, and 9 million pixels. Finally, we will present results on model observer studies. The studies map out how the angular luminance distribution affects the detection of low contrast signals in the presence of image noise. The results from this study are being used to design human observer experiments that will quantify how reveal how and by how much the changing display contrast affects lesion detection.