

The transfer function of an MTF calculation algorithm

The algorithm used to calculate the modulation transfer function (MTF) from an angled edge image has an inherent transfer function. Factors such as angle of the sampling aperture to the edge, registration of profiles using the determined edge angle, differentiation, smoothing and folding all combine to produce the frequency response of the algorithm. Characterization of the transfer function of an MTF algorithm has been undertaken. The description includes the effect of an error in the edge angle determination when registering profiles and calculating the sampling interval. Expressions for the value of the transfer function of each stage of the algorithm at the cutoff frequency were derived. The error in the edge angle determination was found to be a major influence on the MTF of the algorithm. For example, registering 50 profiles sampled at 8 times the cutoff frequency, a 0.01° error in a 4° edge angle will produce a 15% error in the true MTF at the cutoff frequency. The results underline the importance of quantifying the transfer function of the algorithm used when attempting to determine an imaging system modulation transfer function.