C2.0 THE MODULATION TRANSFER FUNCTION (Continued)

ν is the spatial frequency normalized to the cut-off spatial frequency ν_o.

Note that ν_o is the frequency at which all information is lost, not the '3 dB' frequency frequently used in electrical filter theory. The MTF is the inverse Fourier transform of the image produced by a slit source. MTF can be obtained by measuring the intensity $S(\alpha)$ across an image distorted by diffraction and blur, and calculating the inverse Fourier transform. α is the angular instantaneous field of view.

A detector array in the image plane of a telescope has an MTF defined by

$$MTF(f) = \frac{\sin \pi \left(\frac{\Delta x}{2P} \quad \frac{f}{fs}\right)}{\left(\pi \quad \frac{\Delta x}{2P} \quad \frac{f}{f_s}\right)}$$

P = the center-to-center spacing of the detector elements

Δx = the width of the active area of an element

fs = spatial cut-off frequency $\frac{1}{2P}$

f = spatial, as opposed to angular, frequency in the image plane.

The MTF for an array is the Fourier transform of the pixel spread function.