

PHOTONICS spectra®

WHITE PAPERS & APPLICATION NOTES

EVIDENT

What Is the Modulation Transfer Function?

The modulation transfer function, or MTF, is a parameter used to evaluate the performance of a lens. MTF provides a quantitative and standardized way to characterize optical systems, so the metric is used by optical designers and microscopists alike to compare lenses and determine the ideal one for an imaging system.

Optical MTF data is used for a range of instruments, including DNA sequencers, cell analyzers, slide scanners, and industrial inspection equipment. To help assist the optical design process, this white paper will explore MTF in detail and explain the different ways it can be used.

Understanding MTF Measurement

Both resolution and contrast are essential for an image to appear sharp. In simple terms, resolution is the ability to transfer details, while contrast is the ability to distinguish between light and dark areas. Even if resolution is high, a low contrast will render your ability to clearly see sample details. High-quality optics transfer more contrast at higher frequencies (i.e., at a higher resolution), so it is important to measure this ability in optics when designing an imaging system. This can be done through MTF.

MTF measures a lens' ability to transfer the contrast of a sample to an image using spatial frequency (resolution). Spatial frequency indicates the number of line pairs (i.e., one black and one white line) per millimeter (lp/mm). Generally, various charts with equally spaced, alternating black and white lines (Figure 1) are used to measure the MTF of a lens. The contrast is then plotted on an MTF chart against the spatial frequency, as shown in Figure 2 below.



Figure 1: Examples of different spatial frequencies.

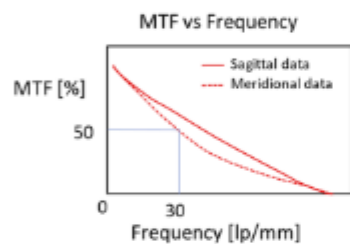


Figure 2: Example MTF chart showing contrast (MTF) vs. spatial frequency. The chart shows 50% contrast at a spatial frequency of 30 lp/mm.

What Is the Modulation Transfer Function?

The modulation transfer function, or MTF, is a parameter used to evaluate the performance of a lens. MTF provides a quantitative and standardized way to characterize optical systems, so the metric is used by optical designers and microscopists alike to compare lenses and determine the ideal one for an imaging system. Optical MTF data is used during the design of a range of instruments, including DNA sequencers, cell analyzers, slide scanners, and industrial inspection equipment. To help assist the optical design process, this white paper will explore MTF in detail and explain the different ways it can be used.

[DOWNLOAD WHITE PAPER](#)

EVIDENT

Visit [Photonics Media](#) to download other white papers and learn more about the latest developments in lasers, imaging, optics, biophotonics, machine vision, spectroscopy, microscopy, photovoltaics and more.

www.photonics.com/WhitePapers.aspx

We respect your time and privacy. You are receiving this email because you are a Photonics Spectra magazine subscriber. You may use the links below to manage your subscriptions or contact us.

Questions: info@photonics.com

[Unsubscribe](#) | [Subscribe](#) | [Subscriptions](#) | [Privacy Policy](#) | [Terms and Conditions of Use](#)

Photonics Media, 100 West St., PO Box 4949, Pittsfield, MA 01202-4949

© 1996 - 2023 Laurin Publishing. All rights reserved. Photonics.com is Registered with the U.S. Patent & Trademark Office. Reproduction in whole or in part without permission is prohibited.



LAURIN PUBLISHING

PHOTONICS MEDIA