

Overview

With CODE V® Image Simulation, you obtain fast, accurate visual assessments of system image quality, including diffraction. Use Image Simulation to:

- Communicate optical concepts and trade-offs to non-optical engineers during design evaluations and product presentations
- Improve qualitative understanding of traditional performance measures
- Determine image quality for complex, multi-element optical systems
- Evaluate the impact of manufacturing tolerances on system performance



Figure 1: Image Simulation of a fisheye lens, showing the effect of manufacturing tolerances on system performance.

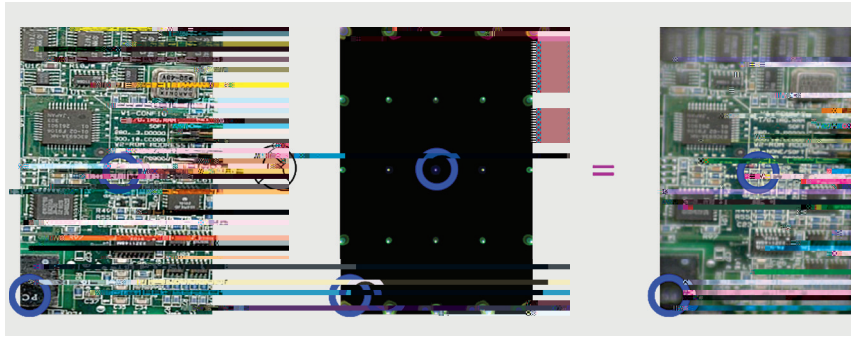


Figure 2: Circuit board image convolved with lens PSF, yielding simulated result

CODE V computes an array of point spread functions (PSFs) from the optical system that is convolved with the pixels representing the input object. Distortion is determined from the chief ray trace. As figure 2 illustrates, the narrow PSF along the lens axis produces relatively detailed imaging, while the aberrated, off-axis PSF causes extreme blurring of the image.

An extensive collection of macro functions allows you to access and manipulate the IMS image data to perform a wide variety of simulation and modeling tasks, such as:

- Modeling veiling glare, over- and under-exposure, and other image defects
- Simulating channel misalignments in a 3-color projection system
- Correcting relative illumination variations in the IMS result

Some example simulation results created using IMS in CODE V are illustrated in Figure 3.

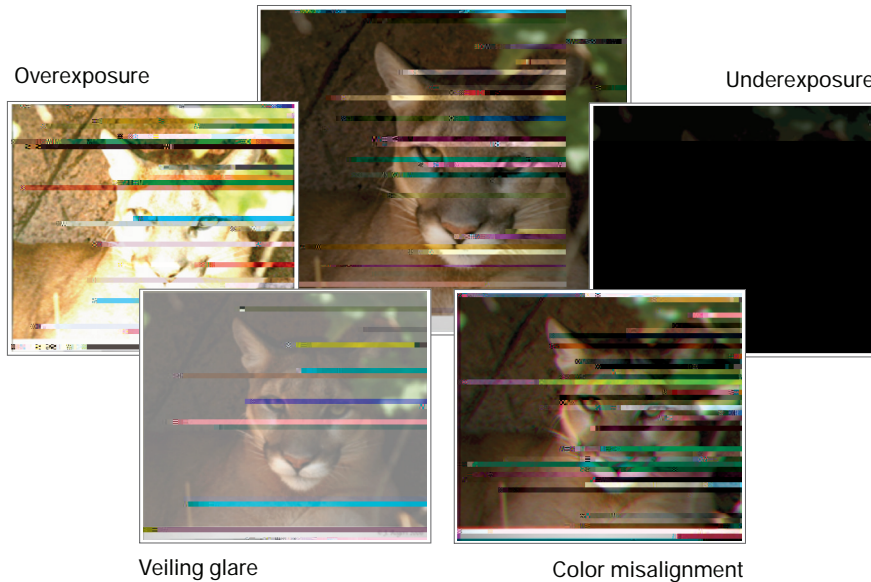


Figure 3: IMS result combined with macro functions

IMS includes mapping functions that allow you to define how the 2D input object is mapped into object space. The mapping functions support analysis of systems with hyper-hemispherical fields of view, which is useful for assessing performance of automotive navigation cameras, surveillance cameras, and DSLRs.

An interesting demonstration of the CODE V IMS using a real-world (or more accurately, out-of-world) object involves the images in figures 4a aen-US34a4349 362519f20 (3e 9 36)20.4 ()1x, Inc3702519fM19f119f019f019f..4 (en-UF) of tiguworl8)19 of t 4a(ed. n