

# Determining blur size with optical aberrations present

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I need to determine the "blur size" for an optical system with fairly large aberrations. I have an optical system design that produces a magnified image of the end of a multimode laser-emitting fiber. This design has a lot of spherical aberration which is going to blur the image and I need to determine what diameter this blur is for various focus settings. I have only have a very, very old version of ZEEMAX and it gives the RMS and geometric spot diameter for one point in the field. What I need is a design program (which my company can't afford) that gives the RMS and geometric spot diameter for the entire image field. Since I don't have that, what is the best way to use the info I have to determine the RMS spot diameter of the entire image?

The conservative approach is to take the geometric radius of the image (as defined by diffraction-limited optics) and add the radial RMS of the spot defined by a spot diagram at a single point at edge of the field. The blur diameter of the aberrated image would be twice the combined radii.

However, I think that this may be too conservative. Alternatively, I could RSS the geometric radius of the image with the radial RMS of the blur (from a single point in the field). However, I'm not sure that this a correct approach either, since the geometric image is a top-hat function and the aberration-induced blur is more gaussian like. - It would be like RSSing apples and oranges.

Other than writing a program to convolute the aberrated image of the point source with a top-hat function, is there any other guidance or "rule-of-thumb" that someone out there can provide?

Thanks

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