Re: diffraction curiosity questions

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- *From*: Helpful person <rrllff@xxxxxxxxx>
- *Date*: Wed, 19 Mar 2008 04:53:46 −0700 (PDT)

On Mar 18, 4:58 pm, AES <sieg...@xxxxxxxxxxxx> wrote:

> In article (info lost) someone wrote:
>
> > Of course it isn't only in optical resonators that this is true. What
> > most optical designers like me find extraordinary is that for an
> > optical system which is "useful" (in other words, not too badly
> > aberrated), the aberrations and hence the diffraction performance, can
> > be estimated through ray tracing.
>
> Is the explanation perhaps that "useful" systems are essentially always
> limited to using low spatial frequencies −− or more accurately, small
> spatial frequency spreads if viewed in an appropriately chosen
> coordinate system?
>
> (since what large spatial frequency spreads do is to scatter / diffract
> / refract light at *large* angles, i.e. out of the optical system −−
> which is seldom useful.)
>
> Or at least, this is another way of viewing the situation.

I think what Brian means is that it is remarkable (and I agree) that 99.9% of lens imaging systems can be designed without the need to resort to diffraction integrals. All that is needed is ray tracing.

Using ray tracing one can either use transverse aberration for lenses that do not need to be "diffraction limited" and wavefront aberrations for those that do. Except in the very rare cases where correction at only specific spatial frequencies is required, performing the final optimization on the RMS wavefront error yields results as good as can be had.

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