
Subject: Re: Image astigmatism
Posted by [Helder Marchetto](#) on Thu, 27 Sep 2012 14:25:34 GMT
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On Thursday, September 27, 2012 11:42:37 AM UTC+2, Mats Löfdahl wrote:

> Den onsdagen den 26:e september 2012 kl. 16:32:26 UTC+2 skrev Helder:

>
>> Hi,
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>> I was wondering if anybody has tried evaluating the astigmatism of an image, or given two
images tell which one is better.
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>> Or does anybody know any good method/reference for doing this?
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> I think more information is needed.
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> For example: What is the (kind of) object being imaged? Do you know anything about the
optical setup? Might there be a significant amount of other optical aberrations that have to be
taken into account?

Hi,
thank you for your interest. I'm dealing with very different type of setups as compared to 99% of
the user group. And most of all I think this type of question is sort of off-topic and would rather fit
in a image processing/analysis group. However, I'm interested in the IDL implementation.
I'll try to answer your question. I'm dealing with an electron microscope (EM) and not the standard
transmission EM. When you focus on an astigmatic image you will most likely see round objects,
however if you go out-of-focus the majority will be elongated along a line I+. For the opposite
focusing conditions (under- or over-focus) the objects will be elongated along a line I-
perpendicular to I+. The idea would be to acquire two images at under- and over- focus, compare
them and evaluate the astigmatism axis orientation and drive the stigmators consequently to
correct for this.

That said, I'm thinking of two solutions:

- 1) some blob analysis, fitting ellipses and evaluating the axis of these for both images.
- 2) evaluating the focus along two axis (x and y) for a focus series. Extract from that the best focus
for x and y.

Well the problem with the two points above are:

- p1) Not always images have blobs... images might only have lines.
- p2) I have not yet implemented strong focus analysis functions. So far the first idea would be
something like `total(deriv(MyImage),1)` and `total(deriv(MyImage),2)`.

For these type of microscopes there is no well defined PSF that I can use (I do have a theoretical one, but it does not contain sources of astigmatism).

I hope things are a bit clearer. At the end, I would really be happy also if I just get appropriate literature references. Hopefully I'll be able to do the rest!

Helder
