

GROUP:

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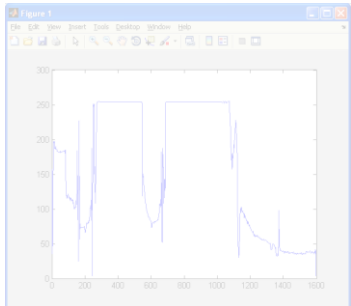
TP 01: Imaging

1. Saturation and intensity adjustment of the camera

Take an image of the same scene at different exposure levels: one with default exposure, one with no saturated pixel and one with only a few saturated pixels.

Picture 1 - default exposure 	Picture 2 - no saturated pixel	Picture 3 - few saturated pixel
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Make line plots to show the saturation level and compare the plots for the three exposure conditions.

Line plot 1 - default exposure 	Line plot 2 - no saturated pixel	Line plot 3 - few saturated pixel
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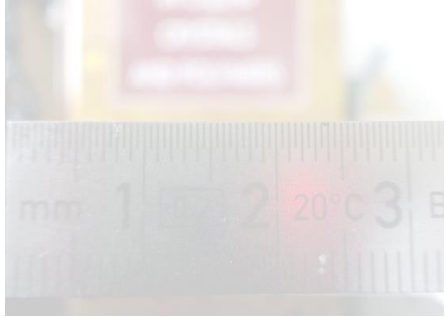
Comments:

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2 Procedure to measure the focal lengths

Show your two images with different magnifications.

Image with magnification one A	Image with magnification two B
	
m_A =	m_B =

Determine the focal length and show the numbers used for the calculation.
($d_{IA}=0.5$ mm for one turn of the objective)

$$f = \frac{d_{IB} - d_{IA}}{(m_B - m_A)} \Rightarrow$$

Make an error estimation (see “Uncertainties and Error Propagation.pdf”) assuming no error is made on d_{IA} and d_{IB} .

Give the steps to obtain the formula for Δf :

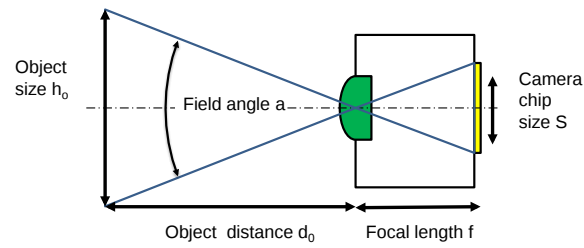
Result:

$f \pm \Delta f =$

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3 Measurement of the field of view (angle of view)



Measure h_o and d_o . Calculate the angle of view (field of view) and make an error estimation.

$$a = 2 \arctan \frac{S}{2f} = 2 \arctan \frac{h_o}{2d_o} \gg \frac{h_o}{d_o} \Rightarrow$$

Give the steps to obtain the formula for $\Delta\alpha$:

Result:

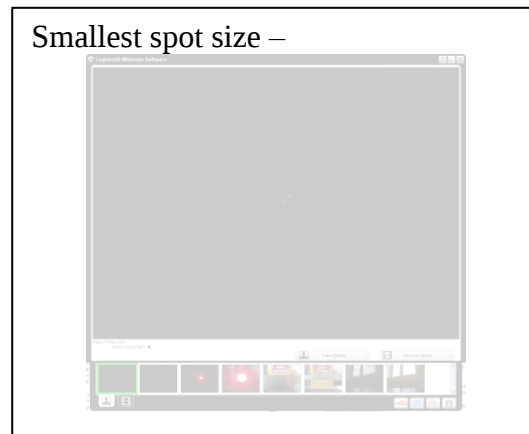
$$a \pm \Delta a =$$

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4 Measurement of the F# number.

A picture of the smallest spot size.



Fill the table below with your measurements of luminous disc size versa relative focusing position (min 5 measurements).

No.	relative position	Spot size in pixel (from image)	Spot size in micron	Angle u	NA	F#
1	0					
2						
3						
4						
5						
6						

Calculate the averaged values

u =

NA =

F# =

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5 Example from real world

Find an example on the internet of **one photographic lens** with small F# number. Try to find something that not all your classmates have. You might look at websites of well-known lens producers such as Nikon, Canon, Leica, Zeiss, Rodenstock, Fuji, etc. You can also include c-mount lenses (used for automated machine vision) in your search. Add a photo **of** the objective!

Photo of your objective



Leica Noctilux-M 1:0.95/50mm ASPH.

Ref: http://www.leicashop.com/brandnew_de/leica-noctilux-m-1-0-95-50mm-asph.html

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(Optional) Personal feedback:

Was the amount of work adequate?

What is difficult to understand?

What did you like about it?

How can we do better?