Path Planning with Fisba

Meaning of color:

Blue: the terminology may need to be unified with other parts of manual

Red: May need to rework due to different reasons or material missing

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# Introduction

### Objective

### Why do these steps necessary?

# Step by step user guide

## Preliminary works

### Lens suitable

Lenses that can be measured by sub-aperture stitching interferometry setup are suitable. For example, includes but not limited to circular flat and freeform elements.

### Add reference arrow on edge

For lenses that are going to be polished by using this system, a reference arrow must be added to its edge. It can be done by using a oil based pen, the finer the better.

(diagram of reference arrow with lens)

### Additional modules required for software

The key component, the path planning program, is written in python with interpreter version 2.7, 64-bit, run under Window environment. As python is an portable programming language, theoretically, it can run in other platform like Linux and Mac OS.

Additional python modules are required, including,

* matplotlib
* numpy
* sympy
* python image library (abandoned actually)
* xlutils
* win32clipboard

Also the interactive shell IPython.

These modules can be downloaded legally and easily from internet.

## Measurement phase

### Perform interferometer measurement

Refers to MJP\_FISBA\_QuickGuild for simple measurement and MJP\_SSI300\_EQuickGuild for sub-aperture stitching. The measurement steps are the same.

### Record the coordinates of reference arrow

After taking a reliable measurement, do not move the lens. Record the reference arrow position of the lens in term of pixel in interferometer CCD. You may use some widgets like needle, paper strip, small string, etc to help you for this purpose.

[diagram of reference arrow in reality during measurement (with needle)]

[diagram of reference arrow in mshape]

[diagram of reference arrow in mshape] (zoom-in)

In this example, x=?, y=? are recorded as the position of reference arrow.

### Export result in .xyz format

Export the result in ‘.xyz’ format for path planning software to analyze and process. For more details, please read .xyz data format in additional information.

## Positioning phase

### Start the path planning software

To start the software, simply double click gui.py to start it. The following graphical user interface will pop up.

[diagram: ppps gui]

### Choose the data file

Load the .xyz file of interferometry measurement result to the path planning software.

Type the name of the file with full path or choose it with the file browser.

[diagram: file browser button and gui main panel]

[diagram: file browser button with choosing the file.]

### Input the reference arrow position

Type in the reference arrow position recorded before in the format [x-coordinate, y-coordinate]. The square blanket is necessary.

[diagram: x,y coordinate reference arrow]

### Place the lens in MJP working chamber

Place it with the reference arrow available to be visualize from outside.

[diagram: lens 24 in chamber]

### Turn on the pump

The following steps aimed to find the exact position and orientation of the lens in MJP machine. You need the jet turned on for this work. Before that, adjust the jet pressure to minimum value to avoid the lens from being damaged by it.

### Impact the jet to the reference arrow

Move the jet so that it can impact to the reference arrow of the lens. You may need multiple trials for this step.

[diagram: jet impacting the reference arrow]

### Input the current nozzle head position to software

Input the position of nozzle head in **MJP machine coordinate**.

[diagram: reference arrow entry on gui main panel]

### Input 2 more coordinates of point on the edge the lens

Repeat the method of impacting the jet to reference arrow to find 2 more points on the edge of the lens and input them to the path planning software.

[diagram: reference arrow entry on gui main panel]

## Removal determination phase

The following steps relate to removal rate and part of the path.

### Adjust resize factor

It

### Adjust removal rate

### Optional functions

### Circular mask

### Cut off value

### Isolate the path

## Path generation phase

### Generate

### Generate even path

# Additional information

### .xyz data format details

The ‘.xyz’ format was originated by Zygo company. It is written in plain text. You may open it with any simple text editor (e.g. notepad, vim, MS Word, etc.). The first few lines are file header which are not important in our case. The interferometer measurement data starts and ends with a row with only ‘#’. The rows in between are the data.

Here is an example,

Zygo XYZ Data File - Format 1

0 0 0 0 ""

0 0 0 0 1 255

0 0 1020 1024

"arrow = [471,70]"

"18"

" "

0 0.500000 6.328000e-007 0.000000 1.000000 0.000000 1.040908e-004 0

1020 1024 0 0 0 0 ""無ens DCI2"

0 1 0 0 0 0 1.000000 0 0 0

0 1 1 0 0 0 0 0 1

1 ""

1.000000 0.000000e+000

#

0 0 No Data

1 0 No Data

2 0 No Data

……  
565 619 -0.037

566 619 -0.031

567 619 -0.025

568 619 -0.020

569 619 -0.017

……

1017 1023 No Data

1018 1023 No Data

1019 1023 No Data

#

For each row, it represents a data point (pixel), with value separated by a tab, (or ‘\t’ in programming representation), which

Value 1: x-coordinate (Unit: pixel)

Value 2: y-coordinate (Unit: pixel)

Value 3: profile deviation (Unit: micrometer). If it is ‘No Data’, it means there was no data detected during measurement.

The number of rows is equal to the number of pixels of measurement. If no measurement mask was used, it equals to the number of pixels of CCD of interferometer.

### Other software components

### Library documentation

### Profiling

# FAQ