

# Add-on: Math Mode

## General

The described module is available for μShape™ 6.22 and higher as an add-on module.

The module **Math Mode** enables the user specific determination of data maps calculated from interferometric measurements taken in different setups. The calculation is conducted in a separate process, the **Math mode**. In this mode the calculation formula can be entered and the resulting map can be displayed in several views. For further analyses the result map can be exported.

## 1. Data Transfer

To use a result for further calculations it has to be transferred to the **Math mode**. This is done by using the **<Transfer>** menu in the measurement mode (M). When adding a result map a unique identifier has to be assigned to the map used as its name in **Math mode**. It is also possible to replace already transferred maps by the current measurement result map.

## 2. Formula Editor

The calculation formula is specified in *Math mode* by editing individual terms of a sum:

$$result = \sum_i term_i$$

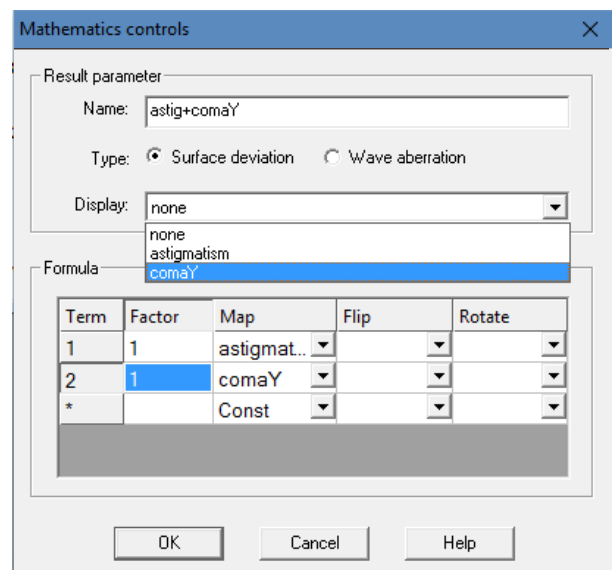
Each term is defined by a data map, a factor and two optional geometrical operations applied to the selected map.

During the calculation first the individual terms are determined which are then added. The addition is done point-by-point. If one map has an invalid data point at one position the result becomes invalid at this position too.

Calculating the individual terms first the geometrical operations are applied to the selected map. Then each valid data point is multiplied by the factor. To add a constant value to each point a default map 'Const' is available.

The result can be named. For data export the aberration type of the result can be set to surface deviation respectively wave aberration.

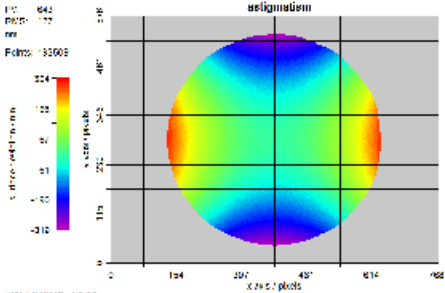
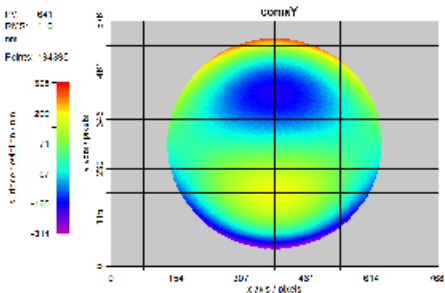
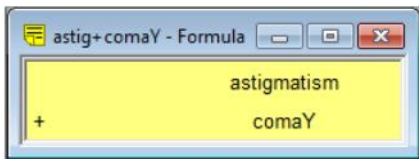
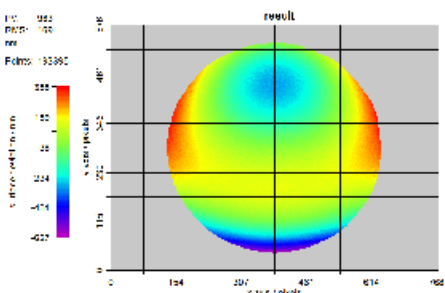
To check the maps behind the identifier it is possible to select one for display.



### 3. Examples


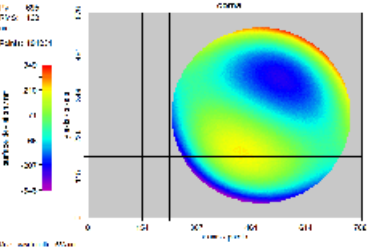
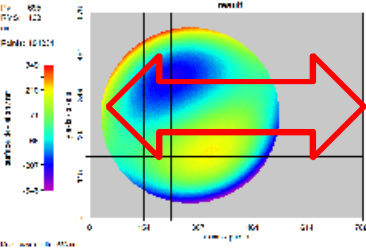
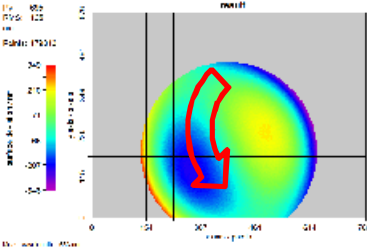
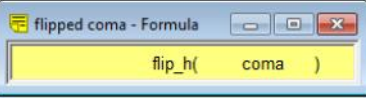
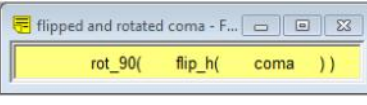
#### 3.1. Addition of maps

The following example illustrates the simple addition of astigmatism and coma. The first two rows show the individual terms, the third row the resulting map.

term 1: astigmatism	<table border="1"> <thead> <tr> <th>Term</th> <th>Factor</th> <th>Map</th> <th>F</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>1</td> <td>astigmatism</td> <td></td> </tr> <tr> <td>*</td> <td></td> <td>Const</td> <td></td> </tr> </tbody> </table>	Term	Factor	Map	F	1	1	astigmatism		*		Const						
Term	Factor	Map	F															
1	1	astigmatism																
*		Const																
term 2: comaY	<table border="1"> <thead> <tr> <th>Term</th> <th>Factor</th> <th>Map</th> <th>F</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>1</td> <td>astigmatism</td> <td></td> </tr> <tr> <td>2</td> <td>1</td> <td>comaY</td> <td></td> </tr> <tr> <td>*</td> <td></td> <td>Const</td> <td></td> </tr> </tbody> </table>	Term	Factor	Map	F	1	1	astigmatism		2	1	comaY		*		Const		
Term	Factor	Map	F															
1	1	astigmatism																
2	1	comaY																
*		Const																
calculation formula																		

### 3.2. Geometry operations

This example demonstrates how the geometry operations work.

	<p>horizontal flip</p> <table border="1"> <thead> <tr> <th>Form</th> <th>Map</th> <th>Flip</th> <th>Rotate</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>coma</td> <td>horizontal</td> <td></td> </tr> </tbody> </table>	Form	Map	Flip	Rotate	1	coma	horizontal		<p>horizontal flip + 90° rotation</p> <table border="1"> <thead> <tr> <th>Form</th> <th>Map</th> <th>Flip</th> <th>Rotate</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>coma</td> <td>horizontal</td> <td>90° cw</td> </tr> </tbody> </table>	Form	Map	Flip	Rotate	1	coma	horizontal	90° cw
Form	Map	Flip	Rotate															
1	coma	horizontal																
Form	Map	Flip	Rotate															
1	coma	horizontal	90° cw															
																		
<p>transferred map 'coma'</p>																		

If you need more information don't hesitate to contact us at [software@trioptics-berlin.com](mailto:software@trioptics-berlin.com).