



College of Optical Sciences



Tricks ...

- Fitting curves and surfaces

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Contents

1. Interpolations

2. Curve fitting

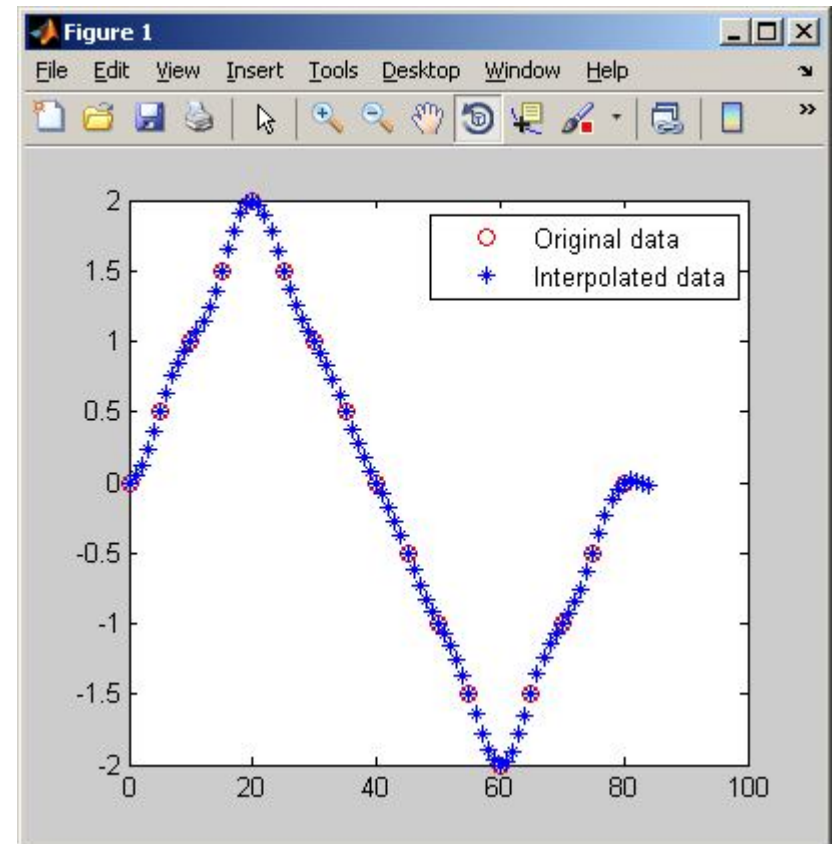
3. Surface fitting

4. Summary



Interpolations

- a) Equally spaced 1-D data
 - *interpft*
- b) monotonic data
 - *interp* (*interp1*, *interp2*)
- c) scattered data
 - Visualization : *delaunay*, *trimesh*, *trisurf*
 - Interpolation : *griddata*



‘Zero-padding’ technique in frequency domain.

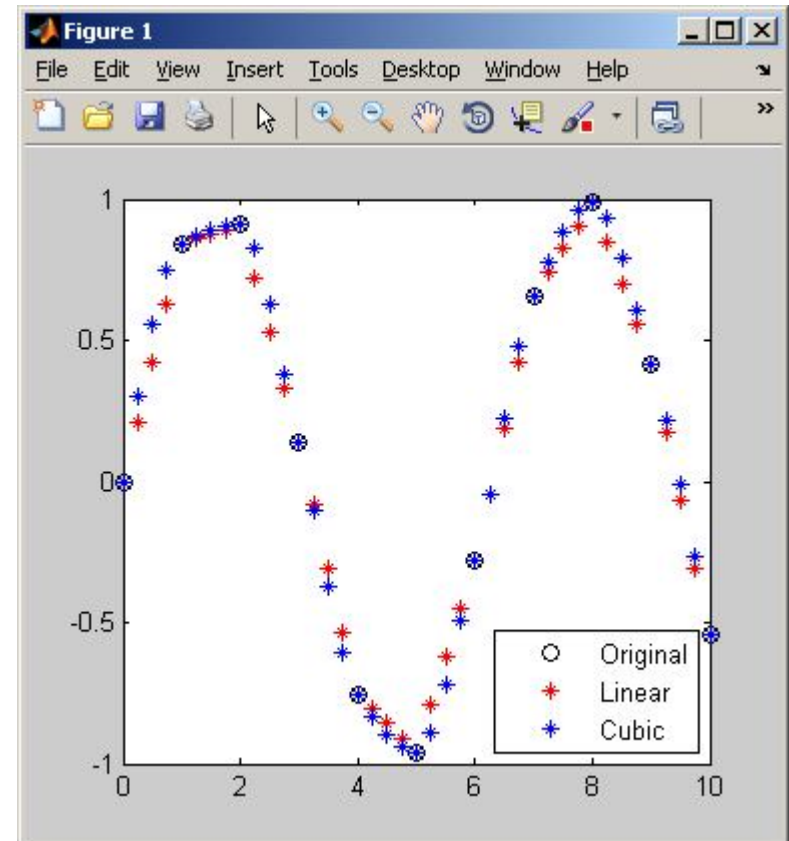


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1-D interpolation options

- 'nearest' Nearest neighbor interpolation
- 'linear' Linear interpolation (default)
- 'spline' Cubic spline interpolation
- 'pchip' Piecewise cubic Hermite interpolation
- 'cubic' (Same as 'pchip')
- 'v5cubic' Cubic interpolation used in MATLAB 5. This method does not extrapolate. Also, if x is not equally spaced, 'spline' is used/



interp1

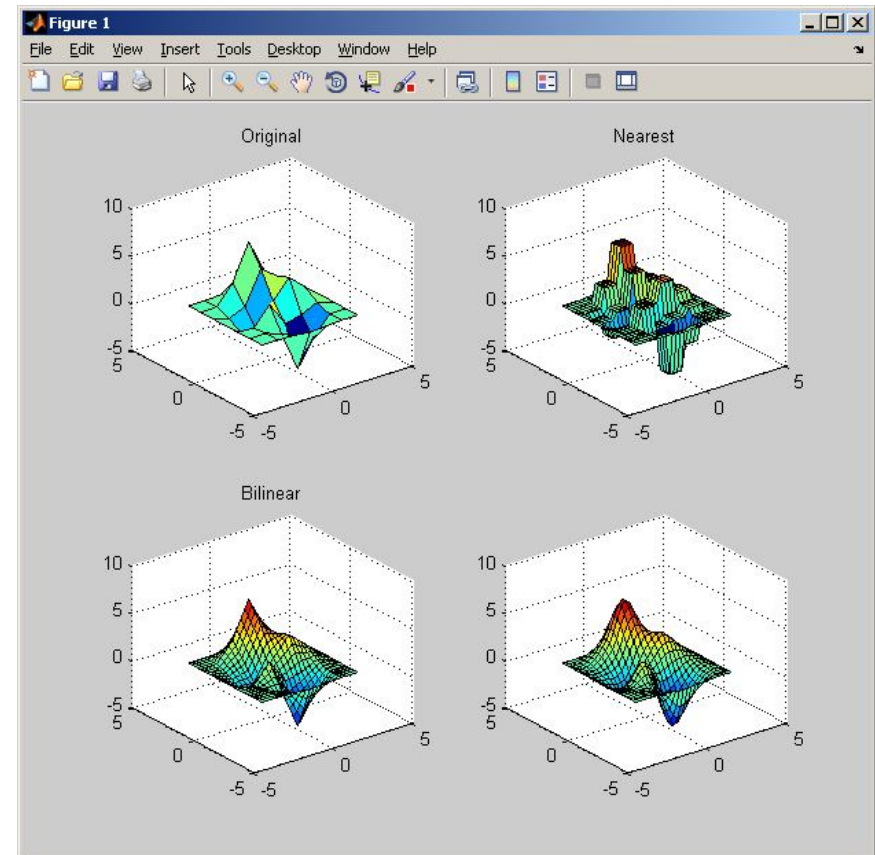


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2-D interpolation options

- 'nearest' Nearest neighbor interpolation
- 'bilinear' Linear interpolation (default)
- 'spline' Cubic spline interpolation
- 'bicubic' Cubic interpolation, as long as data is uniformly-spaced. Otherwise, this method is the same as 'spline'.



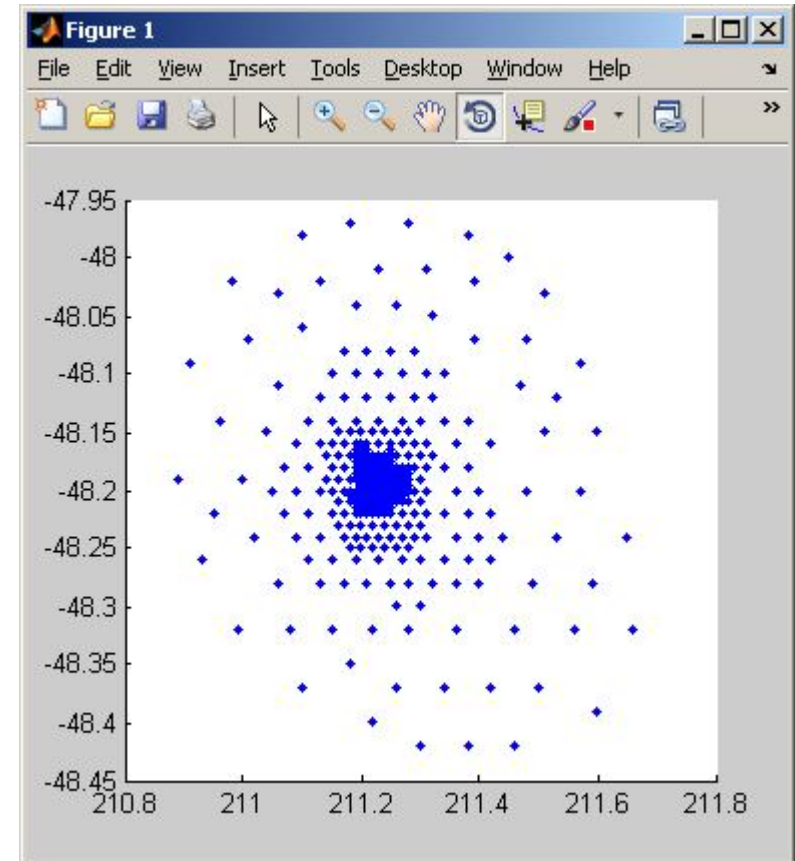
interp2

All of these methods require that X and Y be monotonic



Interpolations

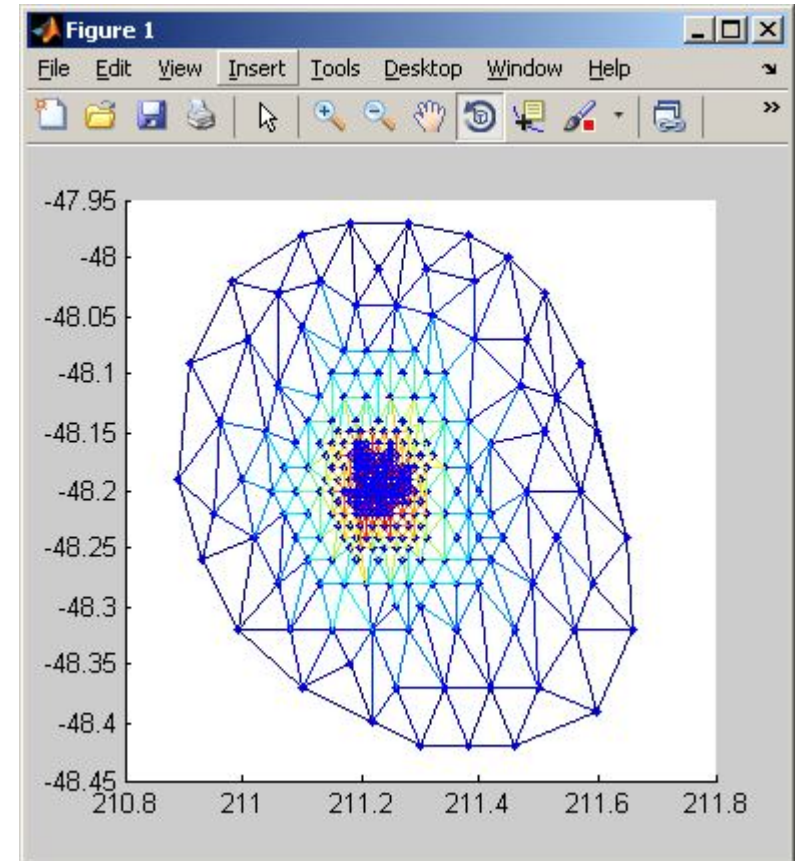
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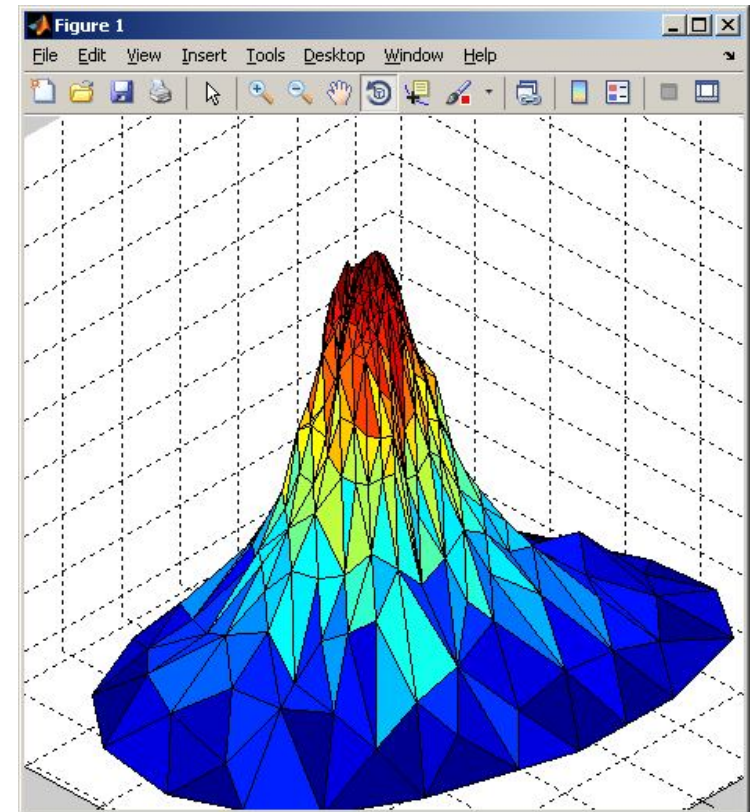


Delaunay triangulation and trimesh



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Delaunay triangulation and trisurf

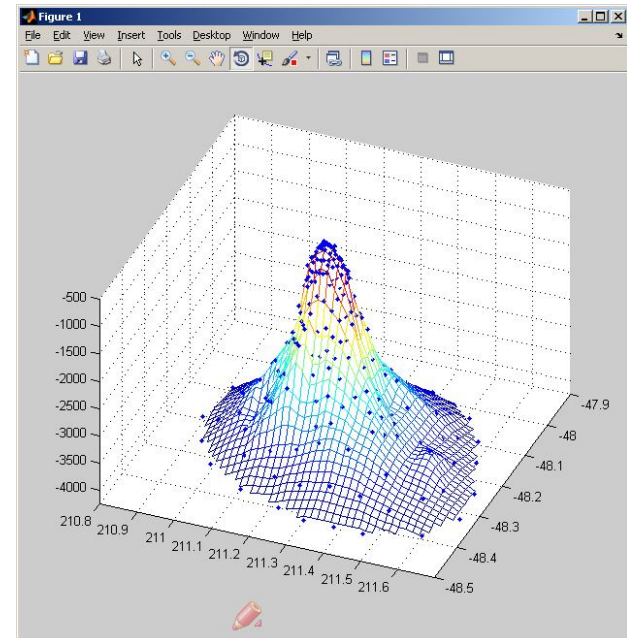
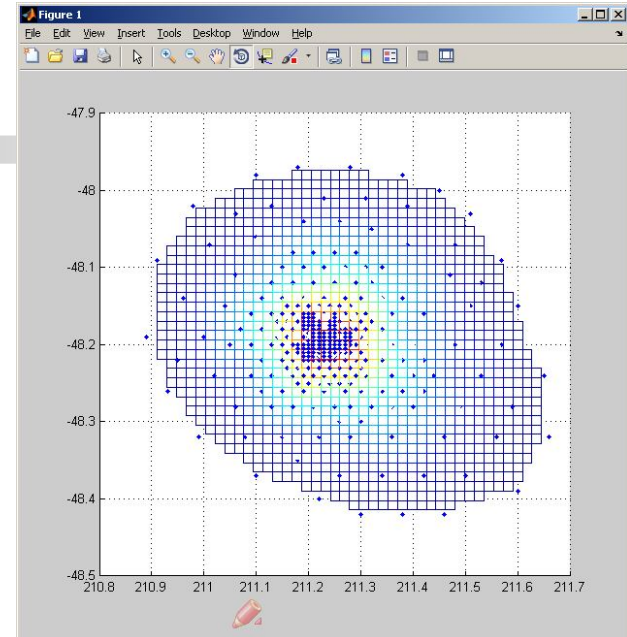


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'*griddata*' interpolation options

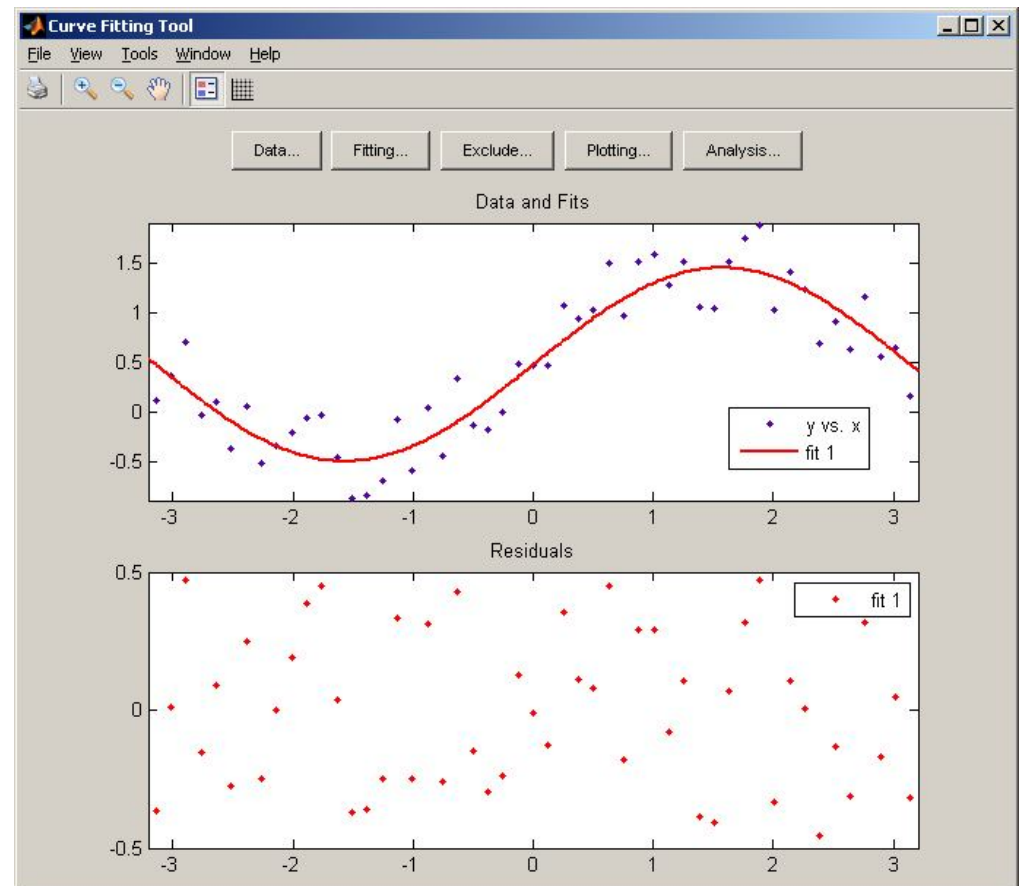
- 'linear' Triangle-based linear interpolation (default)
- 'cubic' Triangle-based cubic interpolation
- 'nearest' Cubic spline interpolation





Curve fitting

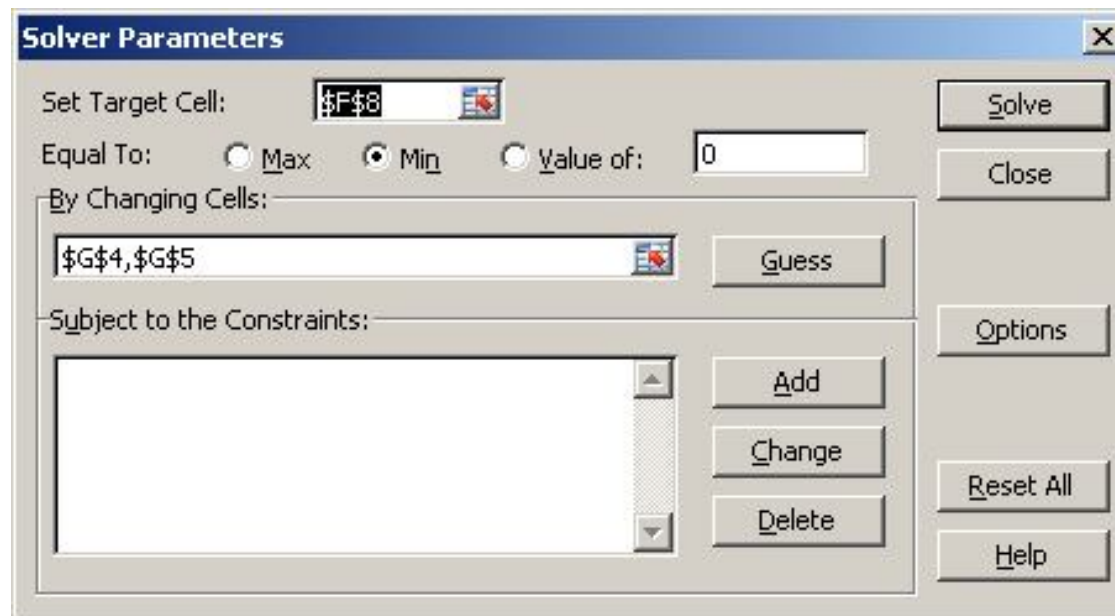
- a) Matlab Tool box : **curve fitting tool**
- b) Microsoft Excel 'SOLVER'
- c) Web application provided by 'zunzun.com'





Curve fitting


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Load the 'SOLVER' add-in (Excel)

The Solver Add-in is a Microsoft Office Excel add-in (add-in: A supplemental program that adds custom commands or custom features to Microsoft Office.) program that is available when you install Microsoft Office or Excel. To use it in Excel, however, you need to load it first.

1. Click the Microsoft Office Button , and then click Excel Options.
2. Click Add-Ins, and then in the Manage box, select Excel Add-ins.
3. Click Go.
4. In the Add-Ins available box, select the Solver Add-in check box, and then click OK. Tip If Solver Add-in is not listed in the Add-Ins available box, click Browse to locate the add-in.
5. If you get prompted that the Solver Add-in is not currently installed on your computer, click Yes to install it.
6. After you load the Solver Add-in, the Solver command is available in the Analysis group on the Data tab.



Curve fitting

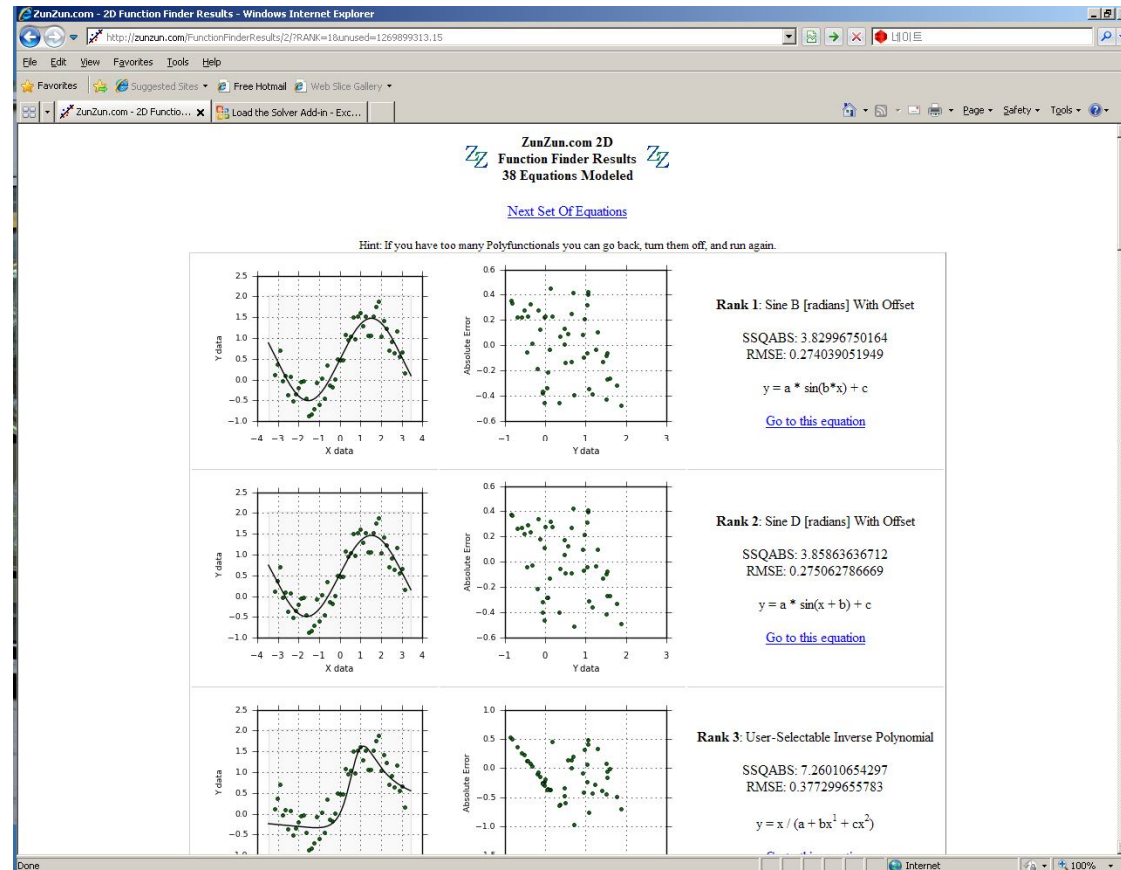
- a) Matlab Tool box : curve fitting tool
- b) Microsoft Excel 'SOLVER'
- c) **Web application provided by**
'zunzun.com'

It will be introduced in 'Surface fitting' Section



Surface fitting

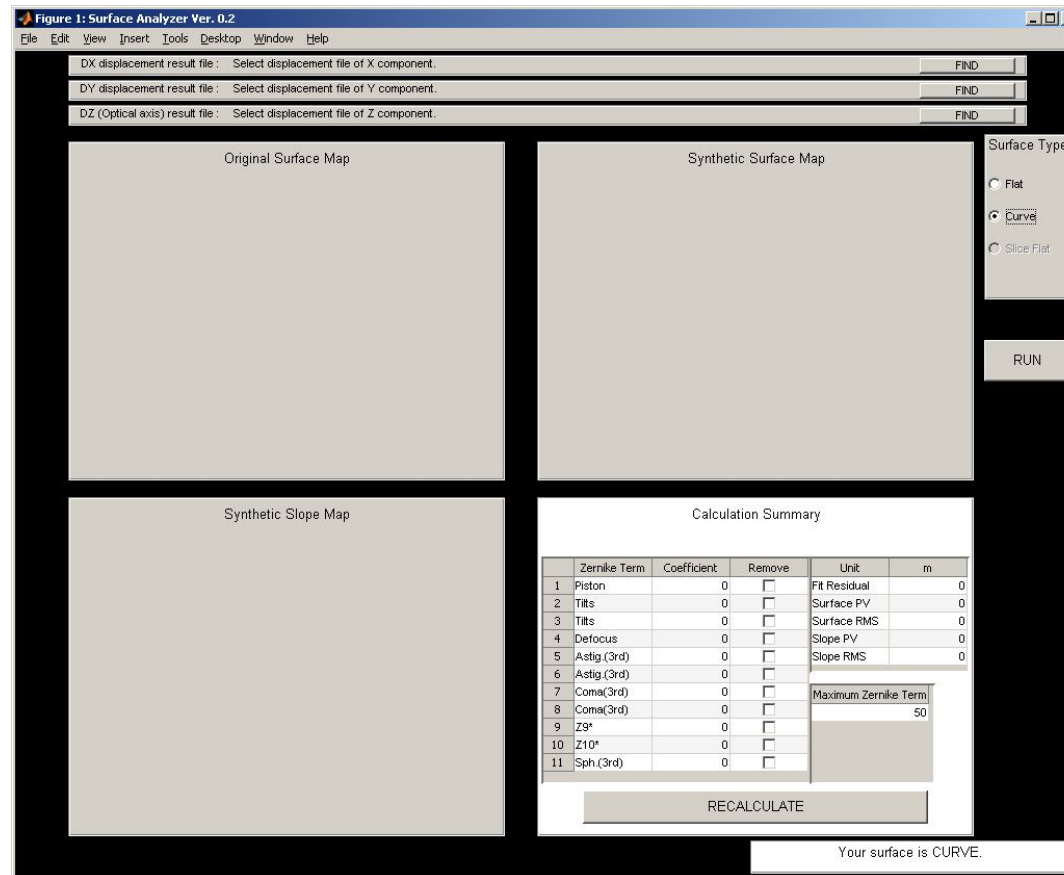
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- b) Zernike polynomials (SA v0.2)





Surface fitting

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Summary

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2. Curve fitting

a) Matlab Tool box : *curve fitting tool*

b) Microsoft Excel '**SOLVER**'

c) Web application provided by '*zunzun.com*'

3. Surface fitting

a) Web application provided by '*zunzun.com*'

b) Using Zernike polynomials (*SA v0.2*)