

Approximate Curve Equation

$$Y = \sum_{i=0}^n A_i * X^i \quad (1 \leq n \leq 10)$$

A_i : complex number, or real number

\$1. Usage

1. Execute Microsoft Excel.

(This application software requires Microsoft Excel.)

2. Input data sets (Xi, Yi) in the cells of Microsoft Excel.

(1) When putting a check mark in the check box (i.e. complex number data):

Each row has pairs of real and imaginary parts of data set (Xi, Yi), like Xi(Re), Xi(Im), Yi(Re) and Yi(Im).

An example is as follows;

	A	B	C	D	E
1	X[Re]	X[Im]	Y[Re]	Y[Im]	
2	171	5.9	61.1	2.11	
3	173	5.97	70	2.41	
4	164	5.66	58	2	
5	165	5.69	64.2	2.21	
6	161	5.55	60	2.07	
7	170	5.86	69	2.38	
8	165	5.69	54.9	1.89	
9					

(2) If NO check mark in the check box (i.e. real number data):

Each row has a pair of data set (Xi, Yi), like Xi(Re) and Yi(Re).

An example is as follows;

	A	B	C
1	X	Y	
2	171	61.1	
3	173	70	
4	164	58	
5	165	64.2	
6	161	60	
7	170	69	
8	165	54.9	
9			

3. Press the left mouse button at the upper-left cell and drag the mouse to the lower-right cell, by holding the mouse button down.

An example is as follows;

(1) When putting a check mark in the check box (i.e. complex number data):

	A	B	C	D	E
1	X[Re]	X[Im]	Y[Re]	Y[Im]	
2	171	5.9	61.1	2.11	
3	173	5.97	70	2.41	
4	164	5.66	58	2	
5	165	5.69	64.2	2.21	
6	161	5.55	60	2.07	
7	170	5.86	69	2.38	
8	165	5.69	54.9	1.89	
9					

≤ 100

(2) If NO check mark in the check box (i.e. real number data):

	A	B	C
1	X	Y	
2	171	61.1	
3	173	70	
4	164	58	
5	165	64.2	
6	161	60	
7	170	69	
8	165	54.9	
9			

≤ 100

4. Select the Excel menu <Edit> \rightarrow <Copy>, for copying the data to the Clipboard.

Note: In the case of saving the inputted data as an Excel file, first save it at #2 step and then copy it to the Clipboard after #3 step.

5. Close Microsoft Excel.

6. Then, execute this application software, Approximate Curve Equation.

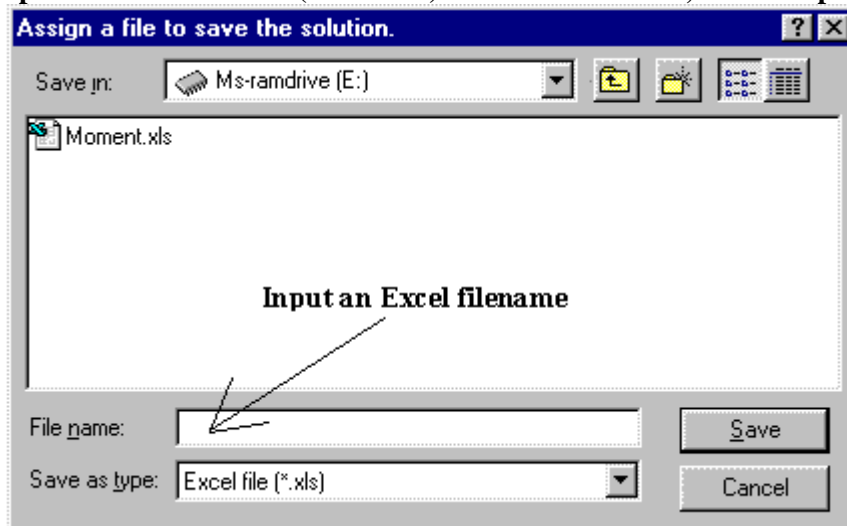
7. Press <Solution> button ($f(x)$).

8. A dialog box which prompts to select a degree of the Approximate Curve Equation appears on the screen, if the data formats are suitable.

Select a degree of the equation and press <OK> button.

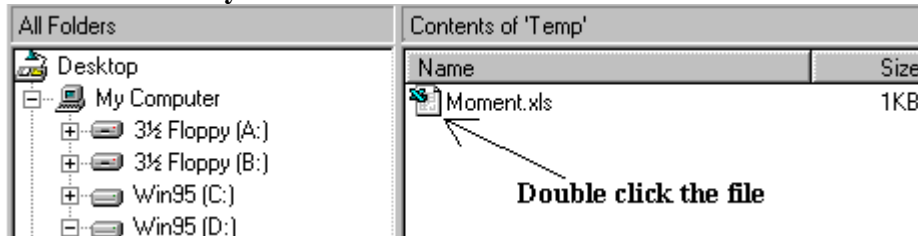
9. A dialog box which prompts to input a filename for saving the solution appears on the screen, if no error occurred.

Input an Excel filename (xxxx.XLS) to save the solution, and then press <Save> button.



10. After saving the solution to the assigned Excel file, a success message appears.

11. Look for the assigned Excel file by using a filer (e.g. Explorer), and double click the file. Then, you can read the solution by Excel.



The data of the results file are expressed by exponent formats.

The data format can be changed to a standard format by the following procedures;

(1) Drag the mouse from the upper-left corner to the lower-right corner of the whole data area so as the background color being inverted.

(2) Select the Excel menu <Format> \rightarrow <Cells...>, and select <Number> tab of the dialog.

(3) Then, select "General" in the selection box of the dialog, and press <OK> button.

Note: Sometimes, a part of the Excel table has "#####."

In this case, please carry out one of the following two procedures;

(A) Execute the above (1), (2), and (3) procedures.

(B) Execute the above (1) and (2) procedures. After that, select "Scientific" in the selection box of the dialog, and set "8" in the "Decimal places" box. Then, press <OK> button.

\$2. Data input with multi-column data to the Excel cells

Input data sets (Xi, Yi) in the cells of Microsoft Excel as follows;

Followings are examples.

1. When putting a check mark in the check box (i.e. complex number data):

	A	B	C	D	E	F	G	H
1	X1 [Re]	X1 [Im]	X2 [Re]	X2 [Im]	Y1 [Re]	Y1 [Im]	Y2 [Re]	Y2 [Im]
2	171	5.9	12.5	0.5	57	1.18	61.1	2.11
3	173	5.97	12.8	0.52	57.7	1.19	70	2.41
4	164	5.66	10.8	0.45	54.7	1.13	58	2
5	165	5.69	11	0.46	55	1.16	64.2	2.21
6	161	5.55	10.2	0.41	53.7	1.11	60	2.07
7	170	5.86	12.3	0.49	56.7	1.17	69	2.38
8	165	5.69	10.9	0.47	55.1	1.17	54.9	1.89
9								
10								
11	Column Number 1		Column Number 2		Column Number 3		Column Number 4	
12								

2. If NO check mark in the check box (i.e. real number data):

	A	B	C	D
1	X1	X2	Y1	Y2
2	171	5.9	2.11	61.1
3	173	5.97	2.41	70
4	164	5.66	2	58
5	165	5.69	2.21	64.2
6	161	5.55	2.07	60
7	170	5.86	2.38	69
8	165	5.69	1.89	54.9
9				
10				
11	Column Number 1	Column Number 2	Column Number 3	Column Number 4
12				

3. When executing the procedure \$1.-7, the following dialog box appears.

Select appropriate column numbers for the analysis, and press <OK> button. Then, execute the procedure \$1.-8.

\$3. Data input to the Excel cells

1. Confirm no data in the Excel cells. Then, press the left mouse button at the upper-left cell and drag the mouse to the lower-right cell, by holding the mouse button down, corresponding to the whole cells in which data are inputted.
2. Select the Excel menu <Format> → <Cells...> → sheet <Number> of a dialog appeared.
3. Select one of the following two processes.

(1) In the case of the input by standard numerical value format ;

Select "General" in a selection box of the dialog, and press <OK> button.

In this case, only input by standard numerical value format (e.g. 10, -3, 14.32, -0.03333, etc.) is allowed at the following #4 step.

Allowed characters for inputting are as follows;

0 1 2 3 4 5 6 7 8 9 . -

(2) In the case of the input by several numerical value formats ;

Select “Text” in a selection box of the dialog, and press <OK> button.

In this case, input by several numerical value formats (e.g. 12, -3.5, 1.3E-2, -2/3, 3/7E2, 3E-2/7, etc. (*1)) is allowed at the following #4 step.

(*1): 3/7E-2 is same as 3/(7E-2), and 3E-2/7 is same as (3E-2)/7.

Allowed characters for inputting are as follows;

0 1 2 3 4 5 6 7 8 9 . - E /

An example is as follows;

	A	B	C
1	X	Y	
2	1/4	36	
3	3/8	37	
4	1/2	39	
5	3/4	42	
6	1	49	
7	5/4	50	
8	3/2	53	
9	2	59	
10	5/2	65	
11	3	72	
12			

4. Then, start data input to the Excel cells.

\$4. Others

It is suggested to select a smaller degree of the equation, as much as possible. If so, the approximate curve may fit in with the whole data sets.

If inputted data (Xi, Yi) are real numbers,

- * drawing the approximate curve equation,

- * copying the curve to the Clipboard, and

- * saving the curve to a disk with filename

can be carried out, after the procedure \$1.-10.