

Eigenvalue and Eigenvector

(matrix with complex number elements)

$$A = \begin{pmatrix} A_{11} & A_{12} & A_{13} & \dots & A_{1n} \\ A_{21} & A_{22} & A_{23} & \dots & A_{2n} \\ \dots & \dots & \dots & \dots & \dots \\ A_{n1} & A_{n2} & \dots & \dots & A_{nn} \end{pmatrix}, \quad \begin{aligned} &|A| \\ &A^{-1} \\ &A\vec{x} = \lambda\vec{x} \\ &\lambda: \text{scalar} \end{aligned}$$

\$1. Usage

1. Execute "Microsoft Excel."

(This application software requires Microsoft Excel.)

2. Input matrix elements in the cells of Microsoft Excel.

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

Each row has a pair of real part and imaginary part of each element, like $A_{i1}(\text{Re})$, $A_{i1}(\text{Im})$, $A_{i2}(\text{Re})$, $A_{i2}(\text{Im})$,, $A_{in}(\text{Re})$, and $A_{in}(\text{Im})$.

Note: Both of real and imaginary part of an element must always be inputted, even 0.

An example is as follows;

	A	B	C	D	E	F	
1	2	0	0.5	0	1	0	
2	4	0	3	0	2	0	
3	-4	0	1	0	4	0	
4	A21 Real Part		A21 Imaginary Part				
5							
6							
7							

Note: The example is a 3x3 matrix with complex number elements.

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

An example is as follows;

	A	B	C	D
1	-2	1	-3	2
2	1	1	1	0
3	4	-2	5	-3
4	5	-1	5	6
5				

Note: The example is a 4x4 matrix with real number elements.

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.

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

An example is as follows;

	A	B	C	D	E	F	
1	2	0	0.5	0	1	0	
2	4	0	3	0	2	0	
3	-4	0	1	0	4	0	
4							

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

An example is as follows;

	A	B	C	D
1	-2	1	-3	2
2	1	1	1	0
3	4	-2	5	-3
4	5	-1	5	6
5				

4. Select the Excel menu <Edit> → <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 (Eigenvalue and Eigenvector).

7. Select one of the following three processes.

(1) In the case of Determinant Value:

Press <Determinant> button ().

(2) In the case of Inverse Matrix:

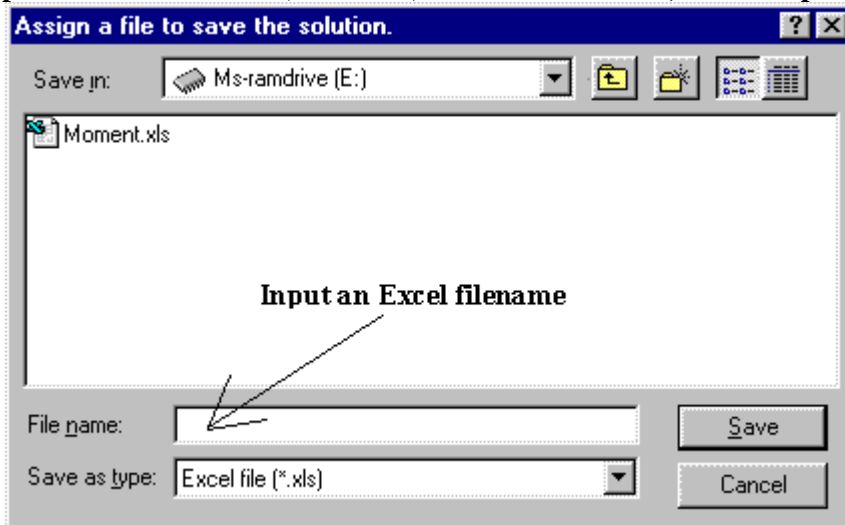
Press <Inverse Matrix> button ().

(3) In the case of Eigenvalue and Eigenvector:

Press <Eigenvector> button ().

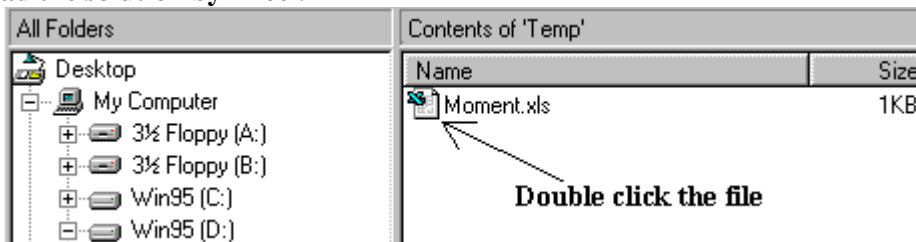
8. A dialog box which prompts to input a filename for saving the solution appears on the screen, if no error occurred.

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



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

10. 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 Excel menu <Format> → <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 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 input 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, 3/7E-2, 3E-2/7, etc. (*)) is allowed at the following #4 step.

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

Allowed characters for input are as follows;

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

An example is as follows;

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

	A	B	C	D	E	F	
1	2.01	0	-1	0	0	0	
2	-1/2	0	1	0	-1/2	0	
3	1.3E-5	0	-1/3	0	2/3	0	
4							

(B) If NO check mark in the check box (i.e. real number elements):

	A	B	C	D
1	2.01	-1	0	
2	-1/2	1	-1/2	
3	1.3E-5	-1/3	2/3	
4				

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