Using Excel as an 'lua' script-writer.

Security warning

The excel file 'Mikes DC magnet.xls' requires 'Macros – Enabled'.
When last saved the file was given a checksum using WinMD5.
If the checksum, when you use WinMD5 on the workbook, is not the same, then do not open the Excel file.
Please download WinMD5 from http://www.winmd5.com/

Checksum for 'Mikes DC magnet.xls' =

faa2e70bd7c81f84b6f9c17511ff0423

Introduction

As an amateur magnetics designer, I realised that the lua script was very powerful but not easy to populate with numbers nor easy to edit.
For experienced Excel users you may find my Excel utility helpful and use it as a starting point for your own script-writer.
I do not explain anything about Excel so if you are not competent then do not go there.

Advantages of Excel

1   Each line in the script is in a structured table where it is easy to visualise the functions and their parameters.
2   Some parameters are independent and have to be entered manually but many parameters are dependent and determined using existing entries.
    Excel formulae are very good at calculating values from other cells.
3   Comments can be added to the table that do not clutter up the lua.
    Comments can be added to the table that appear in the lua.
4   Copy and paste is easy in Excel followed by easy editing of cells.
5   Use of Tickboxes and Dropdown lists can be used to toggle between options.
    See pure iron/steel 1010 option in sheet 'DC magnet'
    See load plot points source file options in sheet 'bn'.
6   Plotted points when output to a text file, can be loaded (by pressing a button) into Excel and used for charts calculations, presentations, etc.

Sheet DC magnet

Colour scheme

For convenience I use a colour scheme as a visual aid.
The colours do not have any bearing on the lua script.
Yellow cells   These are manual entries
Grey cells   These are derived values using other parameters or tables.
Purple text   Comments in the table, not appearing in the lua script.

Table structure

The table consists of 18 columns x 210 rows.
Column1
Contains the lua function terminated by an opening bracket -> '('

Columns 2 -> 16
Are for the function parameters. Functions can have 0 -> 16 parameters

Column 17
States how many parameters are required by the function.
Example line 5 states 4 parameters. This means that any cell contents after Param4 is not read nor entered into the lua script. The unused parameters can be used for notes or calculations etc.

Column 18
Is used for adding comments.
Sometimes these comments are entered manually (yellow cell) or can be derived from other cells and so are grey cells
Note ALL comments must start with a double minus sign '--'. This is an lua requirement

Column 0
To the left of column 1, I sometimes place identity labels. These identities have been picked up by the formula in column 18 and will appear as comments in the lua script.

Filepaths

The sheet contains five filepaths that will require customising.
1   Above the table. Set to the path for saving the lua.
2   Line 176   Change this to the path where you will save the .fem file
3   Line 186   Change this to the path where you will save the density.bmp file
4   Line 197   Change this to the path where you will save the first plot file
5   Line 208   Change this to the path where you will save the second plot file
Note that lua requires the use of double backslash '\\' so for paths (2 -> 5) use '\\'.

Press the button

Pressing the 'Write mikesDC.lua' button will write the lua script as a text file to the nominated path.
Load the lua into a new magnetics problem as described in Readme.txt

Table editing

The sheets are protected without a password to prevent accidental erasure or changes.
To edit the 'DC magnet' table, unlock the sheet.

Rows should only be added or deleted within the body of the table to avoid range errors.
The program should then be able to determine the length of the table.

Special characters

You will notice that some parameters have special characters example '~' and '$'
This is to overcome a short-coming of Excel in that its cells are not strongly typed.
That means that cell contents can be variously converted to text, numbers with decimal places, integers.

To avoid ambiguity and errors in the script, I have had to introduce two special characters which sometimes precede numbers.
$ means write the number as a text string, not as a number with Excel formats.
~   means keep the number as a number with decimal places and do not convert to an integer.
If you experience problems with the script which is down to numbers, then consider using these characters.

Excel charts

I did not show it, but the nodes can be used in an X-Y scatter chart to preview the shapes.
This would join the dots with straight lines but is an excellent sanity check for the entries and frequently identifies mistakes.

Sheet bn

This sheet was included to show how plotted points when output to a file can be loaded into Excel by pressing a button.

The source file path is a dropdown list derived from the list starting at cell "Q3"
When the button is pressed the program loads the text file and writes it as numbers into the yellow table.

Knowing that the data is a b.n plot allows the sheet to be prepared to calculate other things based on the point values. In this case the incremental forces are added to determine the total force across the boundary.

The VBA code

It should not be necessary to edit the vba but it can be inspected using the vba editor.

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