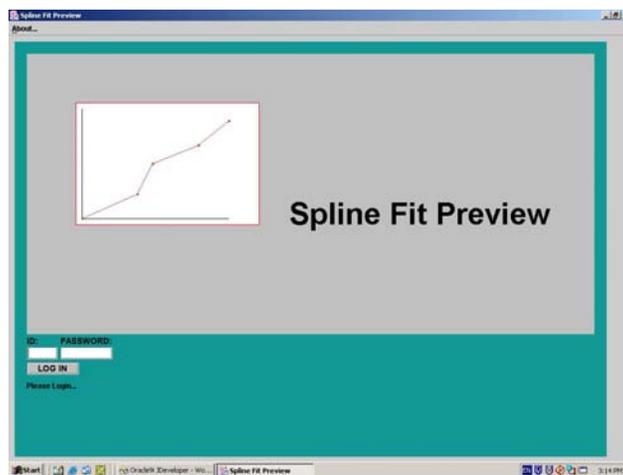


Magnet Mapping (SplineFit) Program

User Manual



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05/05/04

General description

A SplineFit program is developed to provide the means to visually analyze data sets taken from EXCITAION_CURVE and MAG_SPLINE tables (SNS technical database) by presenting the data in a graphical form.

The program calculates a fit for a selected magnet using a normal cubic spline algorithm (*Press, William H. et al, Numerical Recipes in FORTRAN 77: The Art of Scientific Computing, 2nd ed., p.109*), and draws a spline curve based on the calculated values. Removing/adding points of a selected magnet is allowed, and a new spline curve is drawn based on the new set of points. The user can save the set of points in the MAG_SPLINE table and a data file.

The program allows working with a family of magnets (magnets related to the same power supply) which is automatically selected from the database. It calculates average data for such a group of magnets and draws spline curves for the group members as well as an average spline. The average data calculated for the family can be saved in the MAG_SPLINE table and a data file.

The user can look at individual/group/average spline curves in B(I) or I(B) modes. B(I) and I(B) radio buttons are provided to switch between modes.

A graph area is located in the upper part of the panel. All buttons and text fields are located in the bottom. The user interacts with the program by mouse clicking.

Input

User ID and password typed in by the user are required to log in.

ITF and CURRENT for a selected magnet are automatically taken from EXCITAION_CURVE database table

MAG_LENGTH necessary for the field calculation is automatically taken from MAG_MNFCTR_MDL table

FIELD and CURRENT data for a selected magnet are automatically taken from MAG_SPLINE database table

User interacts with the program by clicking on the points of the spline curve in the graph area and using lists and buttons provided.

Output

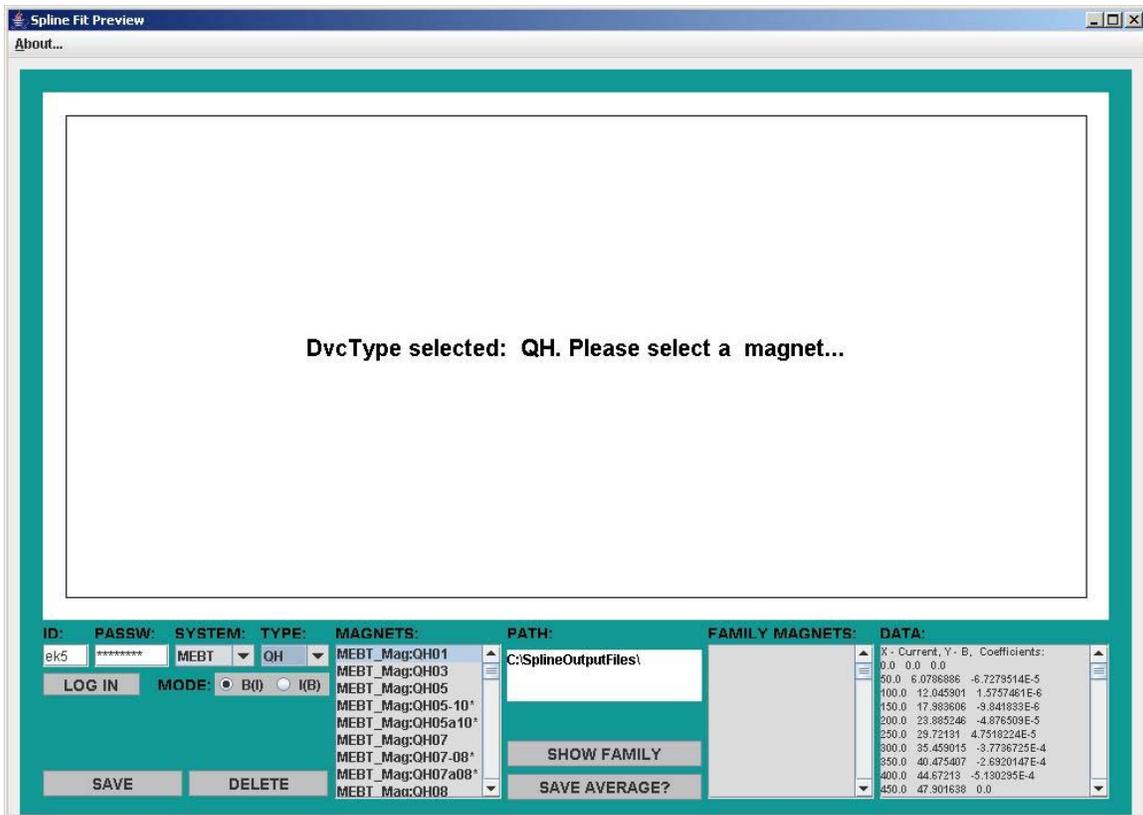
Spline curve and points are shown in the graph area for visual analysis

Currents, fields ($\text{field} = \text{ITF} * \text{current} / \text{magnetLength}$), and coefficients calculated for a selected/average magnet are shown in the DATA text field in the right bottom corner of the panel and can be saved in MAG_SPLINE table; currents and fields can be saved in a data file

C:\\ **SplineOutputFiles** folder for output data files should be created in advance.

Start

Log in using your User ID and Password
Select a system from the SYSTEM list.
Select a device type from the TYPE list.



A list of magnet names appears in the MAGNETS field.

Note, that * at the end of the magnet's name indicates that there is no data for this magnet in EXCITAION_CURVE table

Individual Magnets

Get spline curve and coefficients for selected magnet

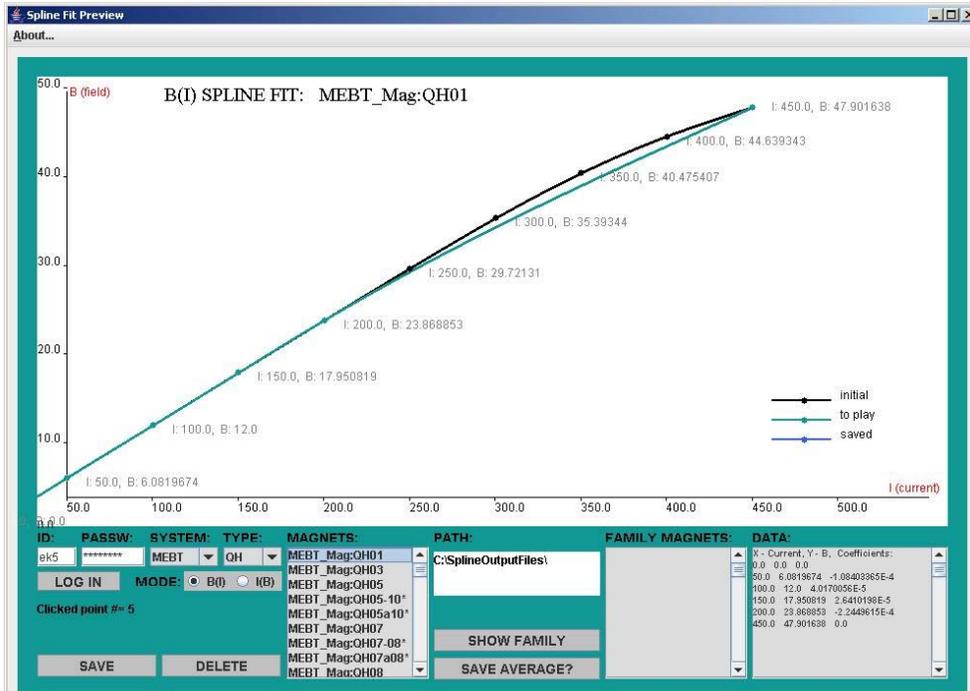
To get a spline curve and points for a magnet, select a magnet name from the list called MAGNETS. Currents, fields, and coefficients calculated for this magnet appear in the DATA text field. Its spline curve is shown in the graph area.

If data for the selected magnet are not saved in the MAG_SPLINE table yet, the spline curve and points are based on data from the EXCITAION_CURVE table and are colored black.

If currents and fields for the selected magnet are already saved in the MAG_SPLINE table, the spline curve and points are based on data from the MAG_SPLINE table and are colored blue.

Playing with points of selected magnet

If the data are taken from the EXCITAION_CURVE table the spline curve and points are colored black. To get the best spline, you can remove/restore any number of points in any order. To select or deselect a point, just click on it.

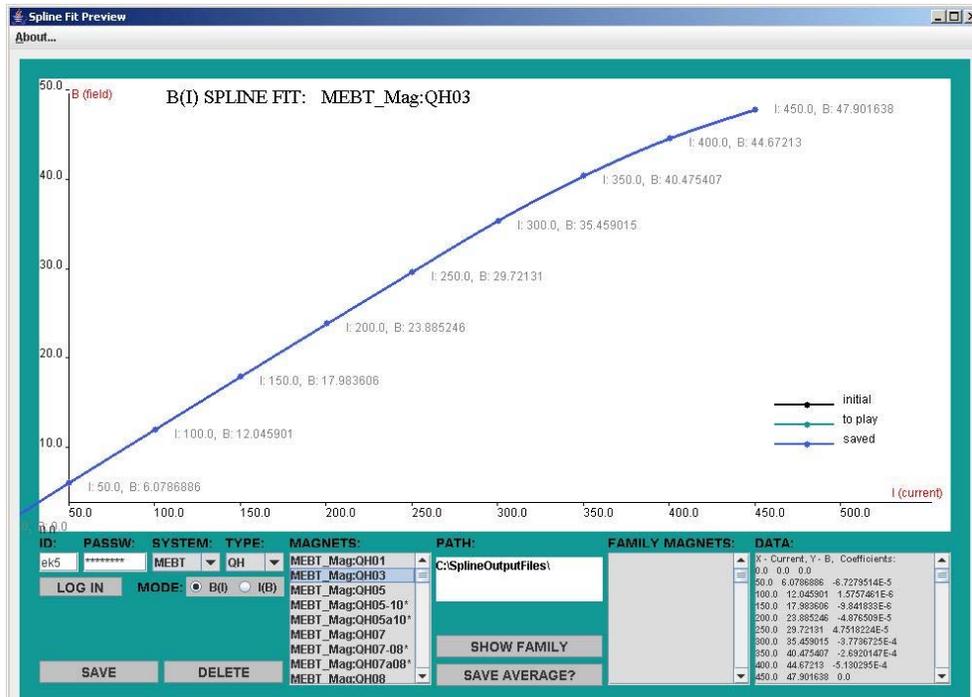


When you play with points, active points are colored green, and removed points are colored black. A new spline curve that is based on currently active points overlays the original curve and is colored green. Currently active points are shown in the DATA text field.

Saving data for selected magnet

To save data for a selected magnet, click the SAVE button. Currents, fields, and coefficients will be saved in the MAG_SPLINE table and in a data file named after the magnet name.

The next time when you select this magnet the new spline curve and points are colored blue and overlay the black original curve, indicating that the data are taken from the MAG_SPLINE table.



Data file format

When you click the SAVE button, a data file named after a selected magnet is automatically created. For example data for CCL_Mag:QH00 are saved in a file named CCL_Mag:QH00.mmt in the following format:

```
# Magnet mapping file for
# CCL_Mag:QH00
# number of entries:
11
# Current ...      Mag.-Field
478.119           46.460575
467.989           45.775143
458.017           45.074074
447.89            44.338604
437.962           43.586834
427.834           42.796707
417.726           41.98486
407.792           41.15852
397.665           40.290535
387.725           39.412674
377.602           38.489876
```

Deleting data of selected magnet

If data for a magnet are already saved in the MAG_SPLINE table, you can not remove/restore points. If you need to do that, click the DELETE button when the magnet is selected, and its data will be erased from the MAG_SPLINE table and from the data file.

The next time when you select this magnet, the spline curve and points will be colored black, indicating that there is no data for this magnet in the MAG_SPLINE table, and that the data for the spline are taken from the EXCITATION_CURVE table.

After the magnet data are deleted from the MAG_SPLINE table, you can start playing with the points again. If you are satisfied with the new spline curve you can save the data by clicking SAVE button.

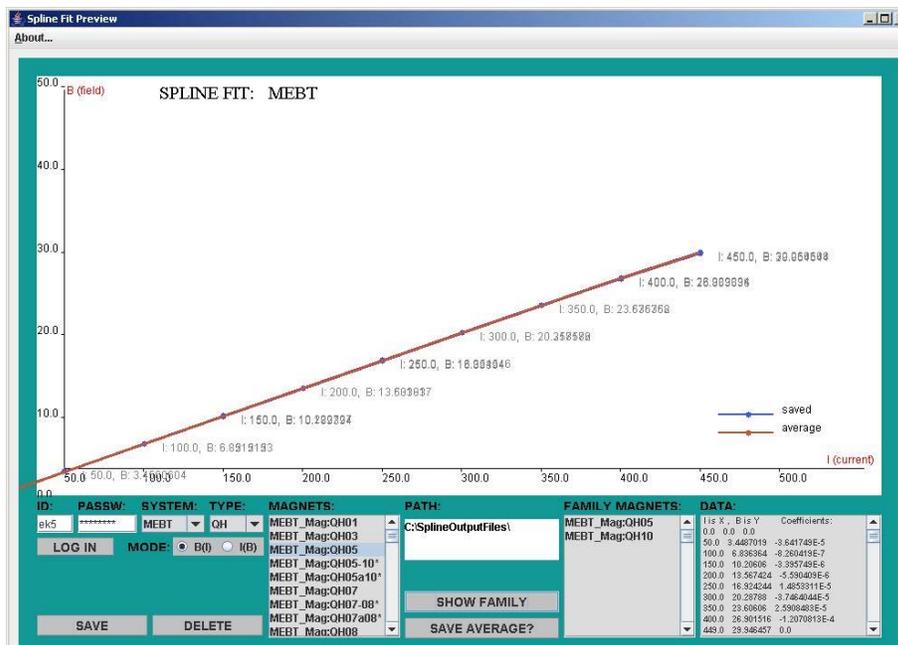
Family group magnets

Family group members are magnets related to the same power supply.

To work with a family group, select a magnet from the MAGNETS list and click the SHOW FAMILY button. The family group is automatically created, and names of all the magnets related to the same power supply appear in the FAMILY MAGNETS list.

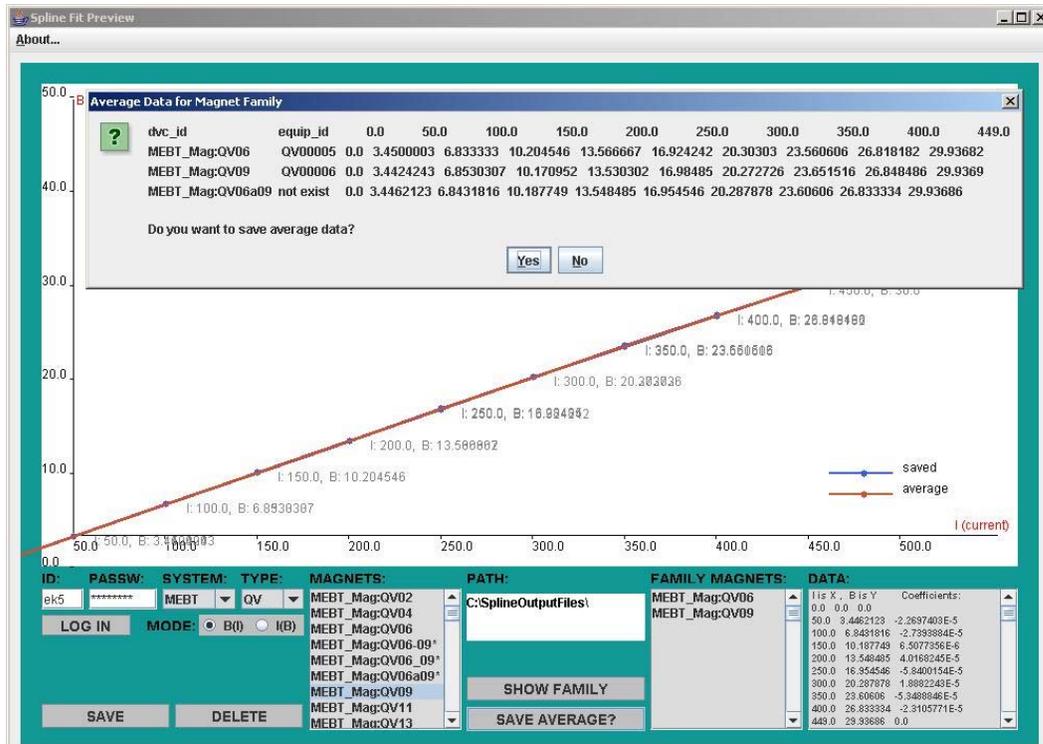
Average of family group

When you click the SHOW FAMILY button, average data for this family appear in the DATA text field. The average spline curve overlays spline curves of the family group members and is colored red.



To look at the data for family group members and at the average data for this group, click the SAVE AVERAGE? button. A virtual magnet is created based on the average data. It is named automatically after the family group magnets. For example a virtual magnet having average data for MEBT_Mag:QH07 and MEBT_Mag:QH08 family group is named MEBT_Mag:QH07a08.

As you click the SAVE AVERAGE? button, you get a pop up window containing currents and fields for the family group members and the average data at the bottom.



Saving average of family group

You can save data for a virtual magnet (that is created based on average data calculated for this family group) in the MAG_SPLINE table and a data file. To save the virtual magnet data, select answer YES after the question "Do you want to save average data?" on the pop up. If you do not want to save the average data now, select NO.

User comments and suggestions are welcome!

Please send your comments/suggestions to the program developer Katia Danilova (edanilova@ornl.gov) for the program updates and improvements.

Attachment 1: Functions of Buttons

LOGIN

to open database connection for a particular user (user ID and password are required)

SAVE

to save currents, fields, and spline fit coefficients for the selected magnet in the database table MAG_SPLINE and in a data file

DELETE

to delete currents, fields, and spline fit coefficients for a selected magnet from the MAG_SPLINE table and a data file

SHOW FAMILY

to get list of family magnets and to get spline curves for all magnets related to the selected PS and their average spline curve

SAVE AVERAGE?

to get data for all magnets of the family group, and the average data

NOTE: to save average data for a family group in a data file and in the MAG_SPLINE table, click YES on a pop up