

Sage Model Notes

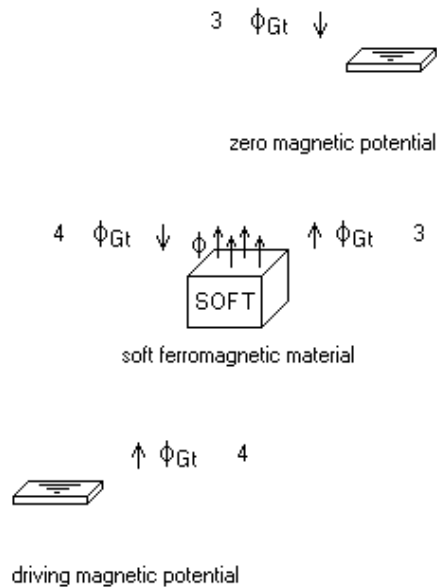
SoftFerroB-Hmap.stl

D. Gedeon
28 September 2012

A model of DC magnetic flux in a bar of soft ferromagnetic material as a function of applied magnetic potential difference. You can use this model to produce data points for a B-H curve to be compared against available data in order to verify that the property values in Sage are correct.

The data produced by this model are for the so-called *anhysteretic* B-H curve, which is midway between the bounding curves of the outer hysteresis loop traced when the applied magnetic field goes from a high negative value to a high positive value, then back the other way.

The Sage model looks like this:



A driving magnetic potential produces a magnetic flux through a soft ferromagnetic material anchored by a zero magnetic potential at the positive (upper) end.

The mean value of input FPsi of the driving magnetic potential determines the magnetic field H in the soft ferromagnetic material:

FPsi magnetic potential (A, deg) 1.000E+03...
(0.000)E+00 Amp
(0.000)E+00 Arg

The length of the soft ferromagnetic material is 1.0 m so the value of H (A/m) is the same as the value of FPsi.

Since only the DC values are of interest the number of time nodes (input NTnode) is set to 1 for this model.

The mean value of FPsi is selected as a mapped variable:

Will Map

FPsi.Mean: 1.000E+01 .. 1.000E+04, 11

When you select the Process → Map menu item Sage will map FPsi.Mean over the range 10 to 10,000 in 11 equal ratio intervals, as specified in the Specify → Mapped Variables dialog.

For reference purposes the mean magnetic flux density B is calculated by a user-defined variable in the soft ferromagnetic material

Bflux 1.994E+00
FB.Mean

When defining this variable the *Write to Log File* checkbox was checked under the Specify → User Variables dialog so that Bflux appears in the text file produced in the mapping.

That mapping text file can be imported into a program like Excel to produce a B-H curve like this:

