TEDDY V1.2

Dr. Theodoros P. Theodoulidis

Department of Engineering and Management of Energy Resources
University of West Macedonia
Kastorias & Fleming
50100 Kozani
Greece

Email: theodoul@ieee.org

INTRODUCTION

TEDDY V1.2 is designed to simulate a number of eddy current inspections by computing the impedance of a coil over layered planar structures (probe coil) or inside and around layered cylindrical and spherical structures (bobbin-ID and encircling-OD coils).
It is provided to the NDT community as a freeware on the condition that its use for publishing results will be referenced. Please send comments and suggestions to theodoul@ieee.org

HOW DOES IT WORK?

The user enters the parameters of the geometry studied, selects the parametes for which to range and plots the curve by clicking the Compute button. The impedance plane can be visualized by selecting “Impedance Plane” on the Tab Control.

PARAMETER INPUT

- While the ranging parameter ranges between the FROM and TO values the other parameters in the TEST INPUT Group Box have their FROM value.
- The parameter range must be increasing and the STEP must not be negative. If STEP=0 then instead of a curve only one point on the impedance plane is depicted.
- Only a few checks are performed concerning the validity of the parameter values. For example whether there is a negative ranging step or the FROM value is GREATER than the TO value.
- No data check is done for the physical meaning of the input data, so be mindful when entering the parameter values. For example TEDDY does not check in the OD case (coil around a cylinder) whether the inner radius of the coil is greater that the radius of the cylinder. Failure of input data may have unexpected results on the impedance plane.
- The dot “.” is used as a decimal separator. If you get an “Invalid Floating Point Values” message and the numbers are right, it may be that your Windows Decimal Point Separator is set to comma “,”. You can change it to “.” From Control Panel, Regional Settings Properties and Number.

COMPUTATIONS

- The impedance plane depicts only the normalized resistance vs the normalized inductive reactance. This is the accepted way of presenting eddy current NDT data. The normalization factor is the inductive reactance of the coil in free-space. This value is also computed and shown on the form together with the inductance of the coil.
- If the curves have unexpected peaks this means that a better computation accuracy may be needed. Changing 0.1% to 0.01% should be adequate. Plot the curve and delete the older curve from the menu option.
- If the curve is not smooth enough you should decrease the value of step or divide the range in smaller subranges.
- There is a progress bar below the impedance plane, which is useful especially in the time consuming 3-D geometries or for many computation points.

Special care has been given in the mathematical computations, which involve computations of infinite integrals, Bessel functions and their integrals and Legendre functions. The following publicly available packages were utilized because of the far greater speed of the computations and the more universal algorithms utilized:

QUADPACK: Automatic computation of infinite integrals (without the need of setting any truncation limits)

AMOSPACK: Computation of Bessel functions and their integrals (to machine precision).

VISUALIZATION OF RESULTS

- You can modify the Axes Limits of the Impedance Plane so that you can see a special area in it. There are two ways to do this: The first is to select “Axes Limits” from the Edit option of the Menu. The second is to click and drag a rectangle on the impedance plane. You can zoom-out only from the menu.
- The color of each curve denotes the parameter ranged. Be careful not to be confused by the various colors when depicting different geometries results in the same impedance plane different geometries.
- Again, depicting different geometries results in the same impedance plane can be confusing regarding the depicted area. Be sure to check the Manual in the Edit – Axes Limits menu to include all results in your viewing area and then zoom or select your desired Axes Limits.
- You can always start a new session and clear the impedance plane by selecting File and New from the Menu. But, if you want to delete only one curve then you select Edit and Delete Curves from the menu. This way you enter the delete mode and you can erase a curve by clicking on it.

SAVE THE RESULTS?

No. You can only save the Impedance Plot image as an *.EMF file (Enhanced MetaFile). Then you can import this image file in your word processor. Be sure to Zoom Out first.

PORTABILITY

- TEDDY runs under Windows 98, ME, 2000 and XP.

MENU DESCRIPTION

[File]

[New]
Clears the impedance plane

[Save As…]
Sends the impedance plane image to an .EMF file that can be imported later into you word processor.

[Exit…]
Closes the application.

[Edit]

[Axes Limits…]
Sets the limits and increment of the horizontal and vertical axes of the impedance plane.

[Zoom Out]
Zoom-out view on the impedance plane. Zoom-in can be done by clicking and dragging the mouse on the impedance plane.

[Delete Curves]
Enters and exits the delete mode. If it is checked the user can delete a curve on the impedance plane by clicking it.

[2D-Geometry]

[Planar]

[1 layer]
Circular coil over a 1 layer halfspace

[2 layers]
Circular coil over a 2 layers halfspace. By setting CON2=0 the user can simulate a conductive slab.

[Cylindrical ID]

[1 layer]
Circular coil over a 1 layer halfspace

[2 layers]
Circular coil over a 2 layers halfspace. By setting CON2=0 the user can simulate a conductive slab.

[Cylindrical OD]

[1 layer]
Circular coil over a 1 layer halfspace

[2 layers]
Circular coil over a 2 layers halfspace. By setting CON2=0 the user can simulate a conductive slab.

[Spherical] (Disabled)

[3D-Geometry]

[Planar]

[1 layer]
Circular coil perpendicular to a 1 layer halfspace

[2 layers] (Disabled)

[Cylindrical ID] (Disabled)

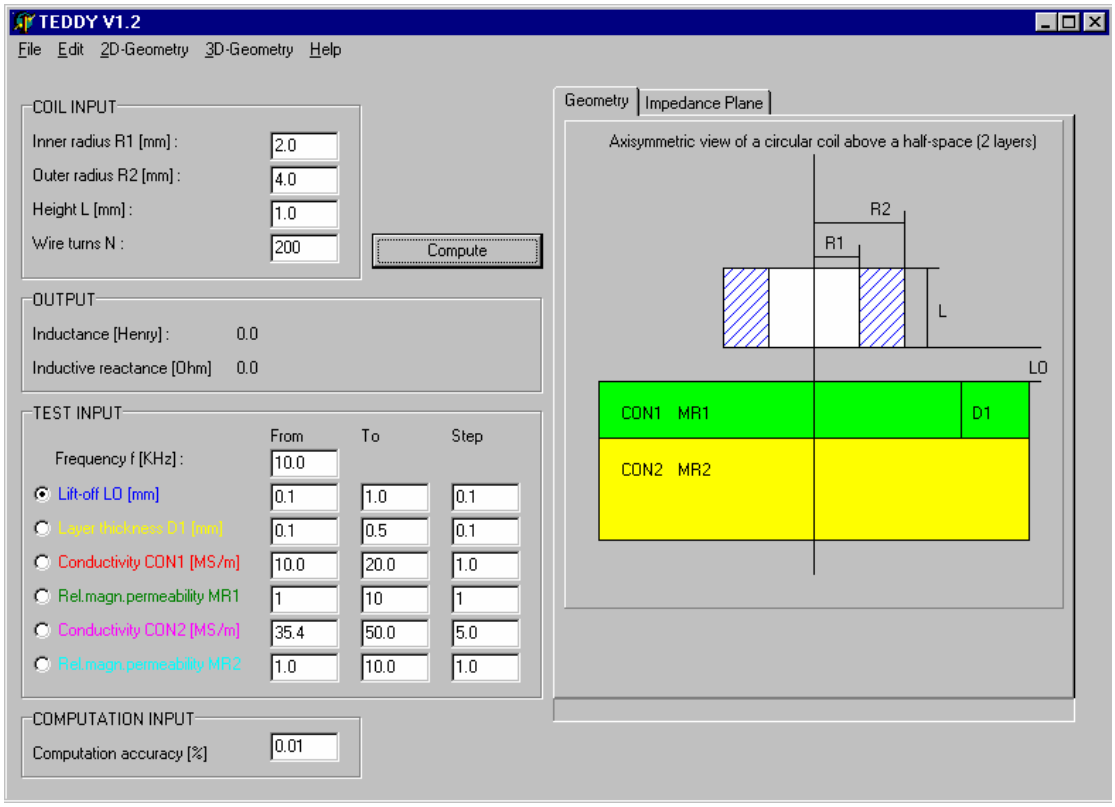
[Cylindrical OD] (Disabled)

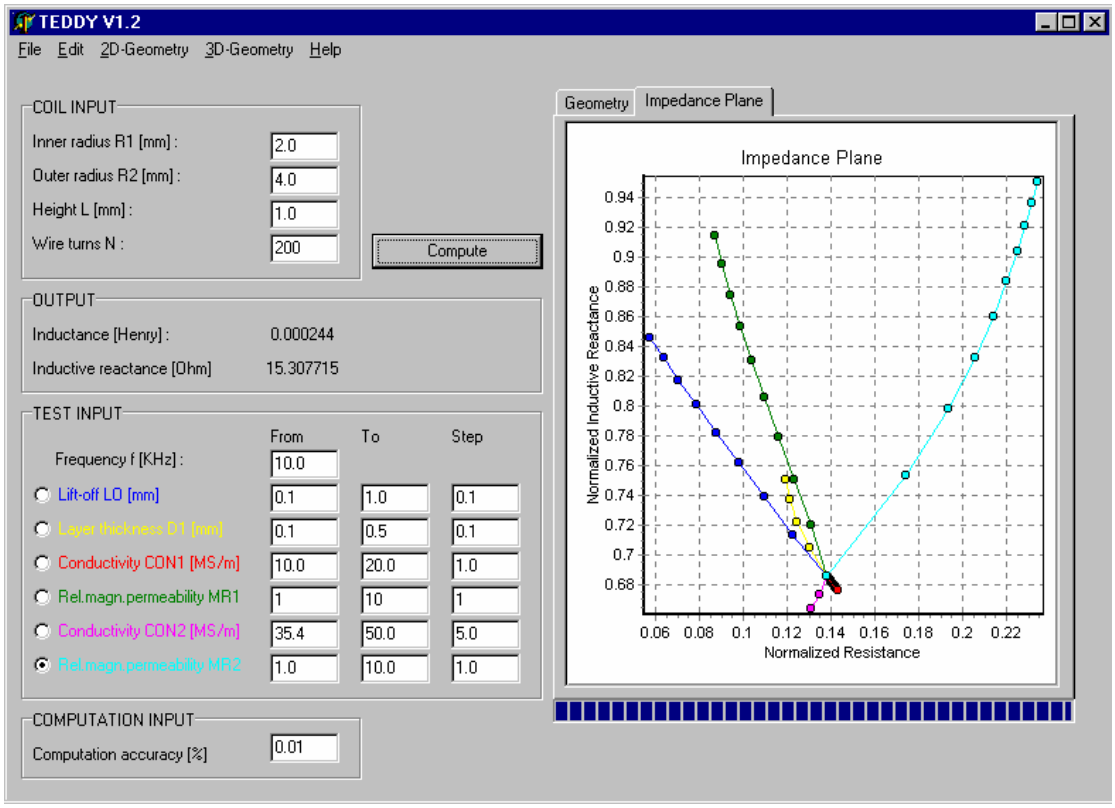
[Spherical] (Disabled)

[Help]

[About]

SAMPLE SCREENSHOTS





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Results from the following papers were used in TEDDY V1.2:

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