Wound torus

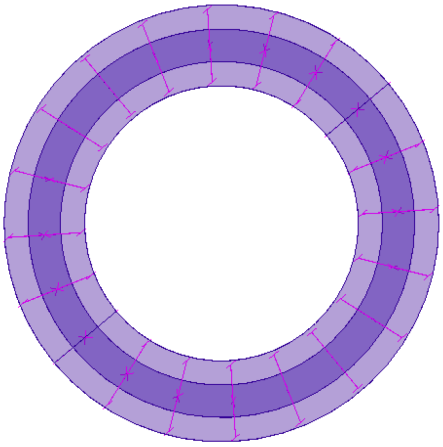
3D Application Note Summary ***(Qualified with Delaunay mesher and User memory mode)***

Introduction

This application note presents the modeling of a wound torus with Flux 3D.

Keywords

Applications	Flux main functions	Post-processed quantities
• Steady State AC Magnetic	• Magnetic cut (3D) • Non meshed coil (3D) • Circuit coupling	• Magnetic quantities, Circuit quantities • Joule losses • Inductance computation

Studied device	
The studied device, represented in figure opposite, is a wound torus. It includes the following elements: • a copper torus • an air region which surrounds the torus • non meshed coils	

In practice

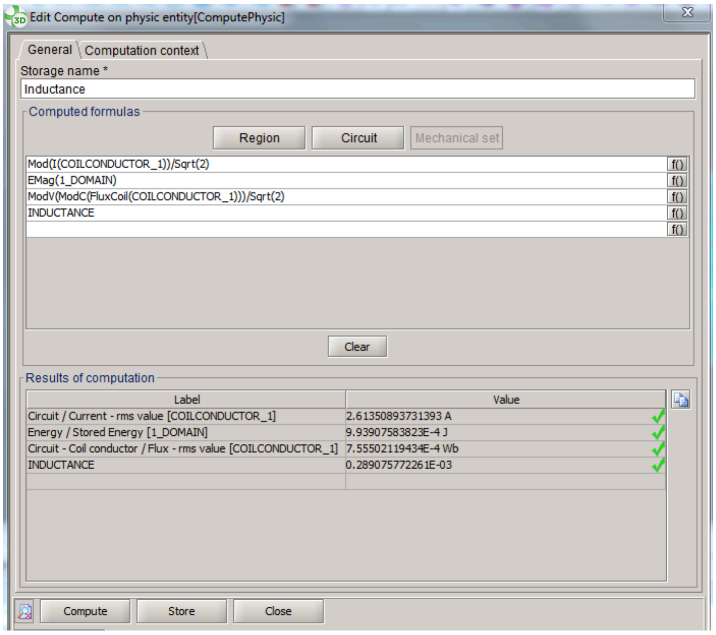
Open example = Open Flux + Run the pyFlux command file

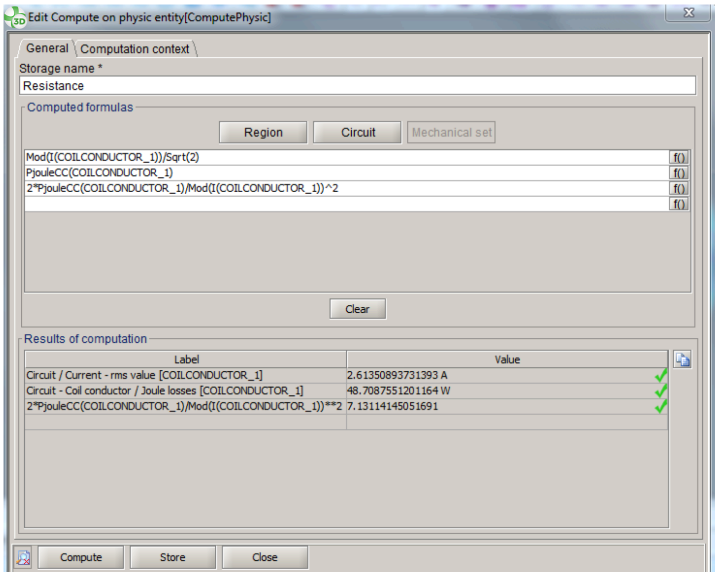
- Recommended memory configuration (standard): 1000 MiB Numerical + 50 MiB Character + 300 MiB GUI
- Computation time: 20 min < t < 25 min [64 bit - 16 GB RAM - 2.2 GHz]

Example 1: With an airgap

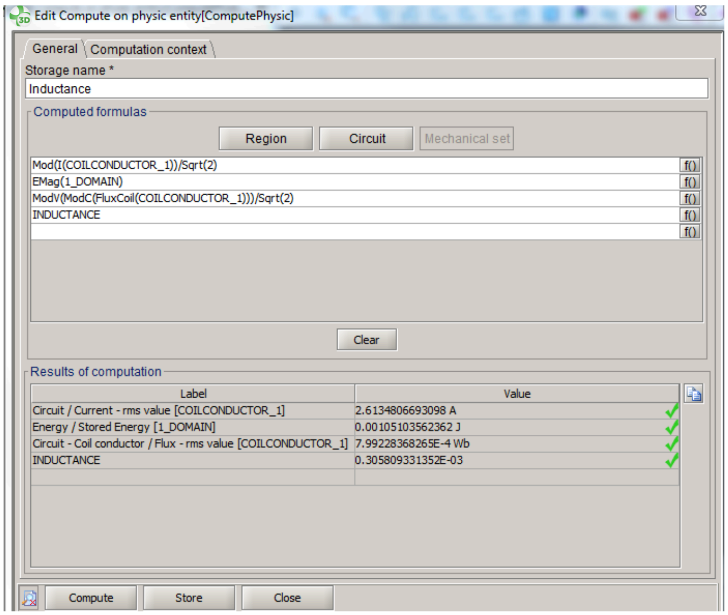
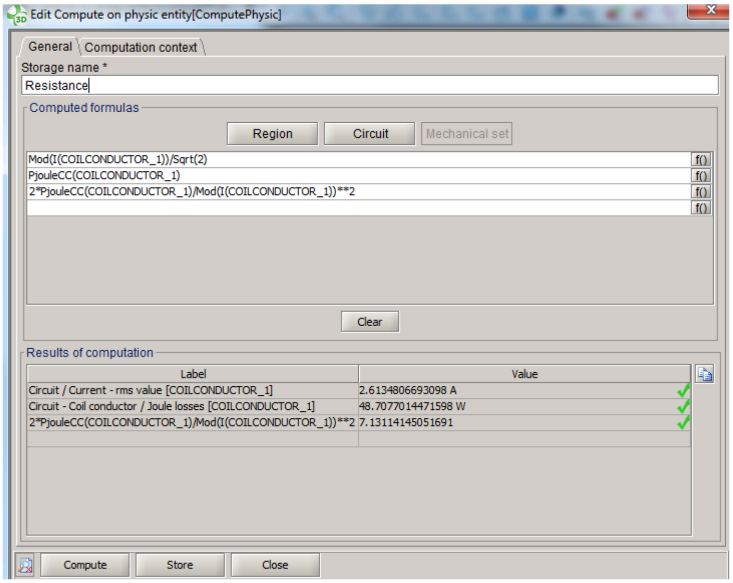
The resistance and the inductance of the torus (with an airgap) are calculated each with two different methods which give the same results:

- Impose a resistivity to the non meshed coils and compute the total resistance of coils
- Compute the Joule losses and the current and deduce the resistance
- Compute the stored energy in the torus and current in coils and deduce the inductance
- Compute the magnetic flux in coils and deduce the inductance





Example 2: Without an airgap

The resistance and the inductance of the torus (without airgap) are calculated each with two different methods which give the same results:

- Impose a resistivity to the non meshed coils and compute the total resistance of coils
- Compute the Joule losses and the current and deduce the resistance
- Compute the stored energy in the torus and current in coils and deduce the inductance
- Compute the magnetic flux in coils and deduce the inductance