



MANATEE™ V2 TUTORIAL

Export of airgap flux distribution from Altair Flux software

VERSIONING

Rev.	Date	Author	Checker	Approver	Description
A	07/07/21	SN, JLB	JLB	JLB	Initial



EOMYS ENGINEERING
121 rue de Chanzy
59260 Lille-Hellemmes
FRANCE
+33 (0)9 81 36 63 46
www.eomys.com

1 Objective

This article details how to export the radial and tangential airgap flux density from Altair Flux 2D for reuse in Manatee. Both time and space (along the airgap middle) airgap field waveforms must be exported to perform vibro-acoustic simulations under Manatee.

Note that the flux import feature of Manatee cannot be used in the case of a Flux 2D magnetoharmonic simulation of induction machines.

2 Airgap flux export method

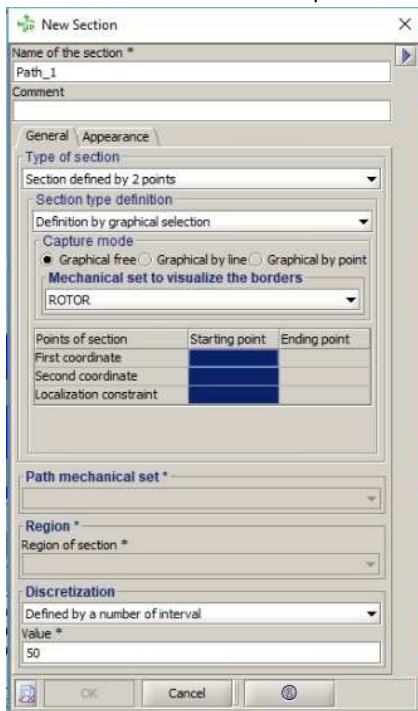
Create a static flux density curve in cylindrical coordinate (Spatial flux density)

This method can be used in a project with the application transient magneto 2D or magneto static 2D

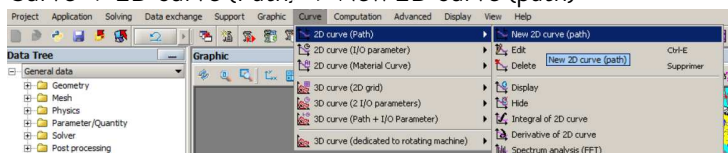
- Launch a simulation with a solving scenario in Flux project as usual.
- Create a new cylindrical coordinate (path) (optional if already create one):
 - Support -> Path -> New



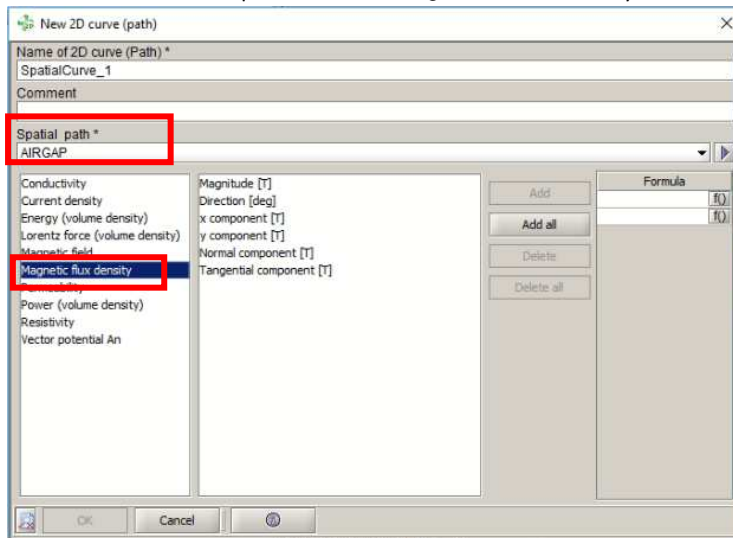
- Click Add -> Define a new path in the air gap



- Create a curve of the flux density:
Curve -> 2D curve (Path) -> New 2D curve (path)



- Choose the created path and the magnetic flux density

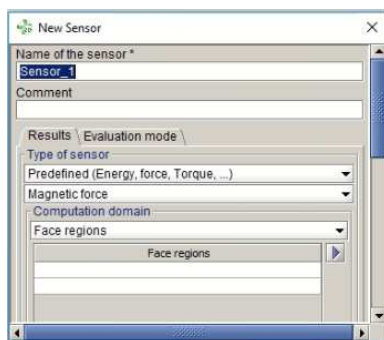


- Flux2D will calculate the magnetic flux density curve
- The curve can be exported to Excel:
 - Curve -> 2D curve (Path) -> Excel export
 - Right click on the curve label -> Excel export

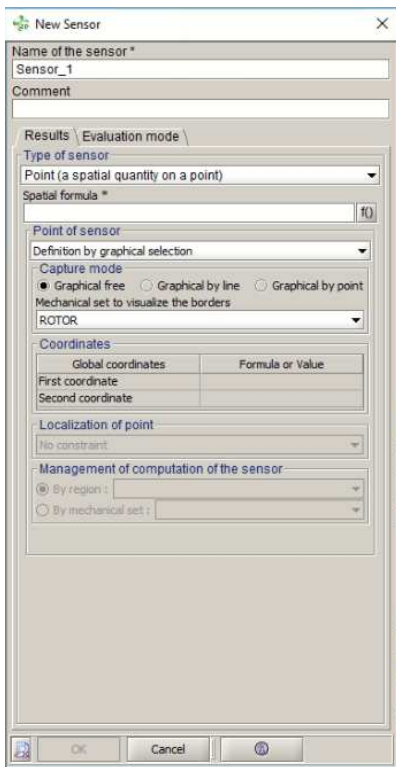
Create a temporal flux density curve of a fixed point

This method can be only used in a project with the application transient magneto 2D, not for the application magneto static 2D

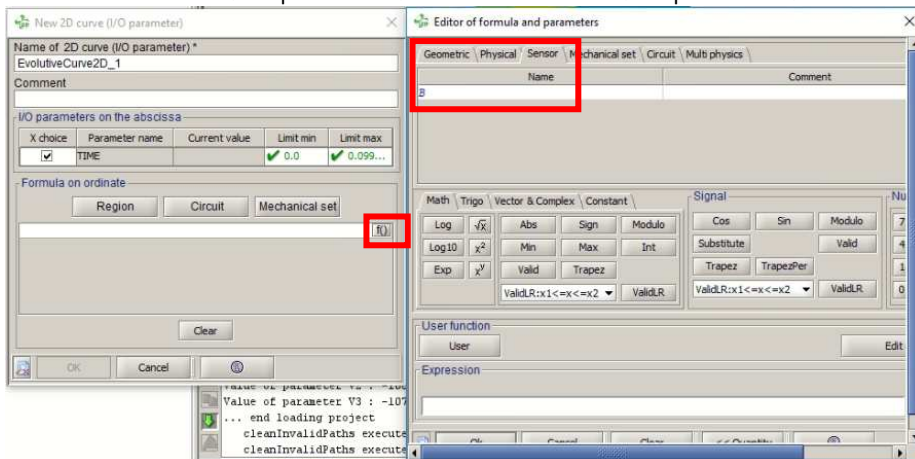
- Create a flux density sensor
 - Advanced -> Sensor -> New



- Choose Type of sensor = Point -> Define the sensor position



- Create a curve of the flux density:
Curve -> 2D curve (I/O parameter) -> New 2D curve (I/O parameter):

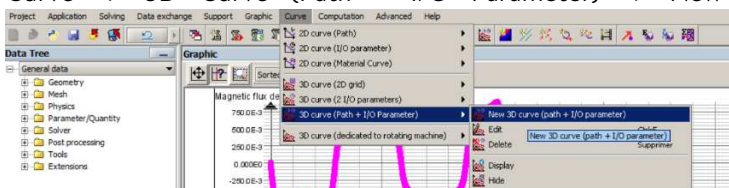


- Flux2D will calculate the magnetic flux density curve
- The curve can be exported to Excel:
 - Curve -> 2D curve (Path) -> Excel export
 - Right click on the curve label -> Excel export

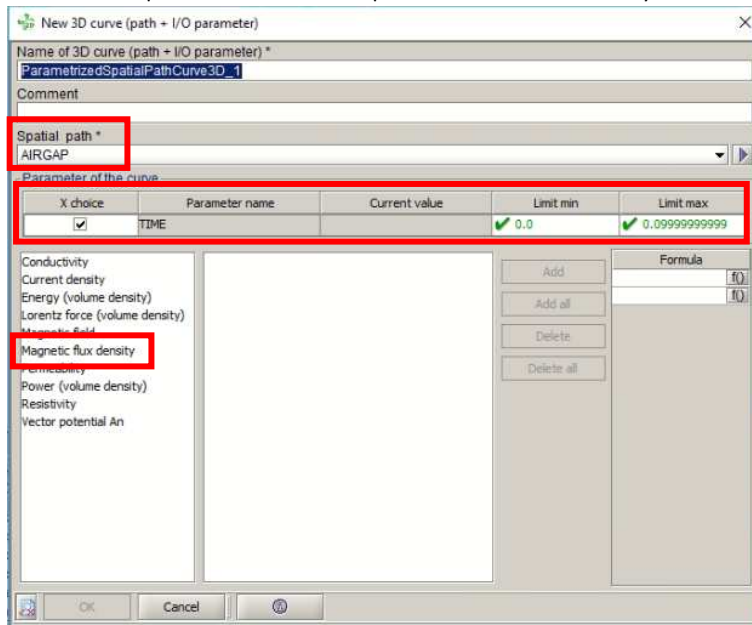
Create a flux density 3D curve in cylindrical coordinate (temporal and spatial)

This method can be only used in a project with the application transient magneto 2D, not for the application magneto static 2D

- Create a flux density 3D curve:
Curve -> 3D Curve (Path + I/O Parameter) -> New 3D curve (path + I/O parameter)



- Choose the period, the created path and the flux density



- Flux calculates the 3D curve (versus position and time) automatically
- The curve can be exported to Excel:
Curve -> 3D Curve (Path + I/O Parameter) -> Excel export
- Save the radial and circumferential airgap flux matrices function of time (lines) and angle (columns) in two separate Excel sheets
- To help Manatee gather metadata and speed up the import process, you can rename the Excel file using the following notation:
 - “_rad_N0=A_Id=B_Iq=C_Tem=D.xlsx” where A is the speed in [RPM], B the Id current in [Arms], C the Iq current in [Arms], D is the electromagnetic torque in [Nm] (you can include . for float values)
- In case of skewing, slice data can be specified in the sheet name “Slice=E_z=F” where E is the slice number starting from 0 (negative z, non-drive end) to N_{slices} (positive z, drive-end), and F is the slice axial position (middle of lamination is at z=0) in [m]

3 References and abbreviations

3.1 EOMYS document references

Ref.	Name	Description
[E1]		

3.2 External references

Ref.	Title
[R1]	

3.3 Abbreviations and nomenclature

FEMM	Finite Element Method for Magnetics
FEM	Finite Element Method
MANATEE	Magnetic Acoustic Noise Analysis Tool for Electrical Engineers
mmf	Magnetomotive force
CA	Calculated angles
SCIM	Squirrel Cage Induction Machine
PWM	Pulse Width Modulation
f_s	Fundamental stator frequency
p	Pole pair number
s	Slip
Z_r	Rotor slot number
Z_s	Stator slot number