

## LINEAR MOTOR

Flux 3D : project step by step

# Summary

Create the 3D geometry from 2D project.

Physics.

Mesh.

Back EMF computation

# Starting a new project : new project

Open Flux 12.1 supervisor

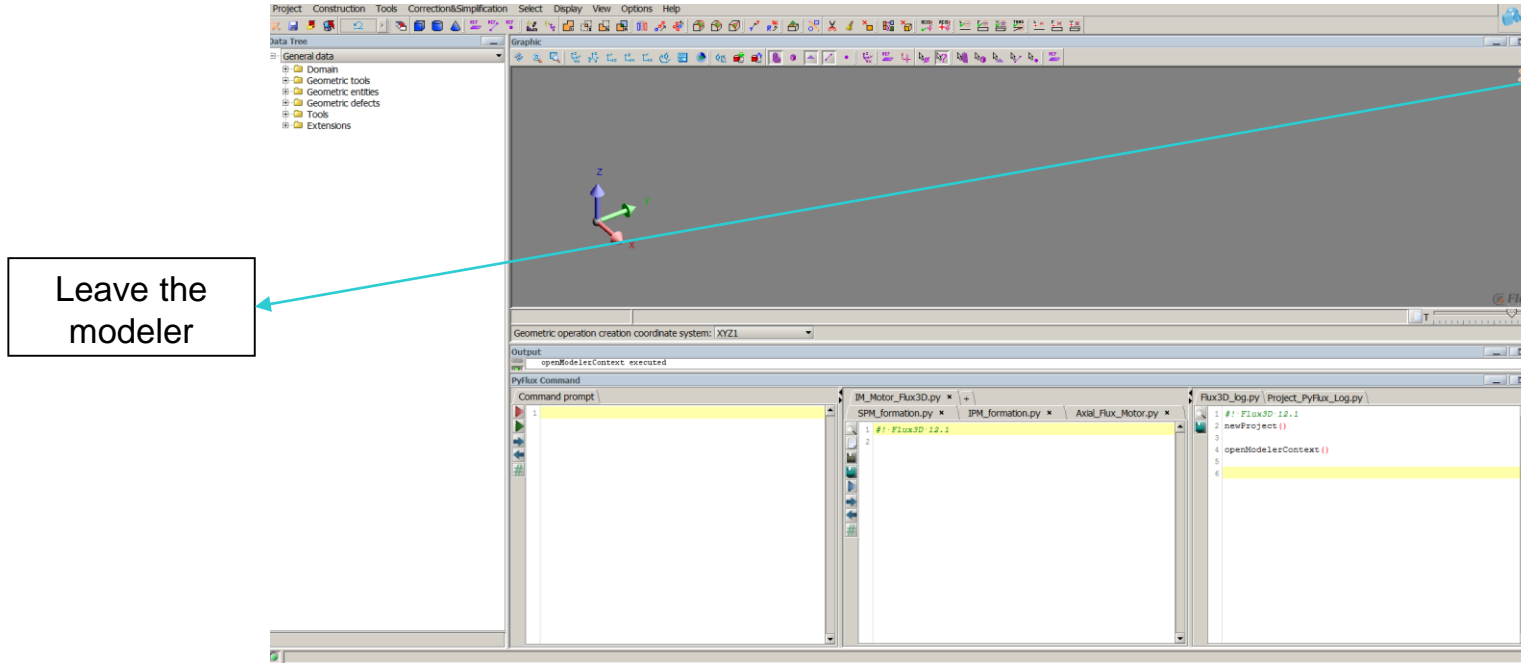
Start a new project

Start a new project



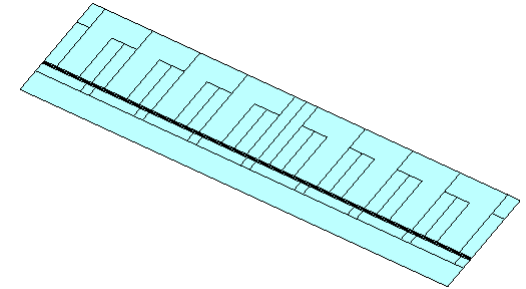
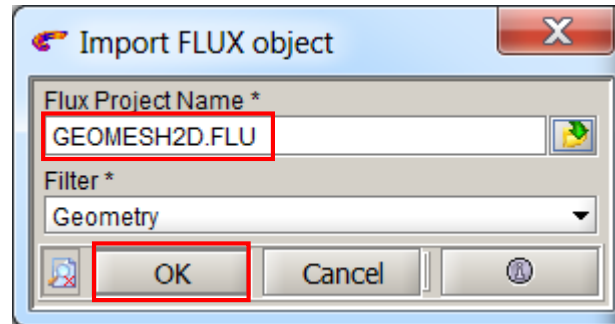
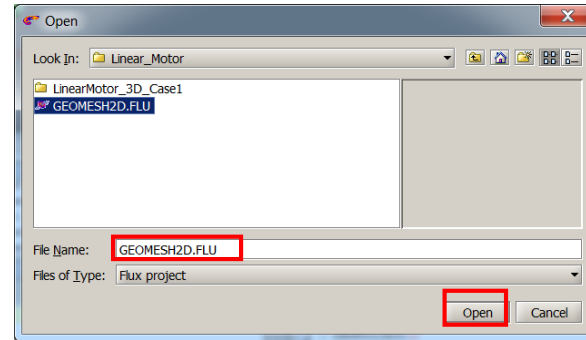
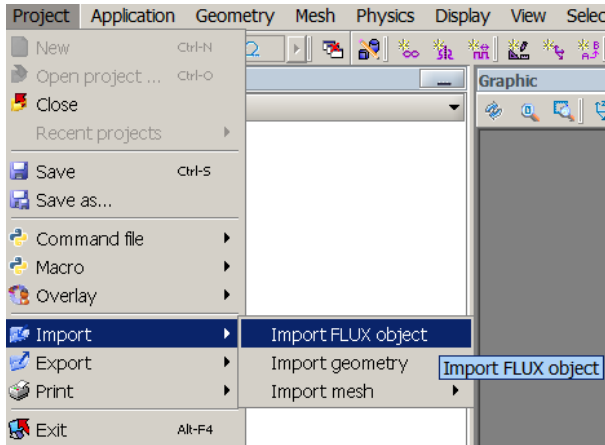
# Starting a new project : new project

Leave the modeler context



# Create the geometry

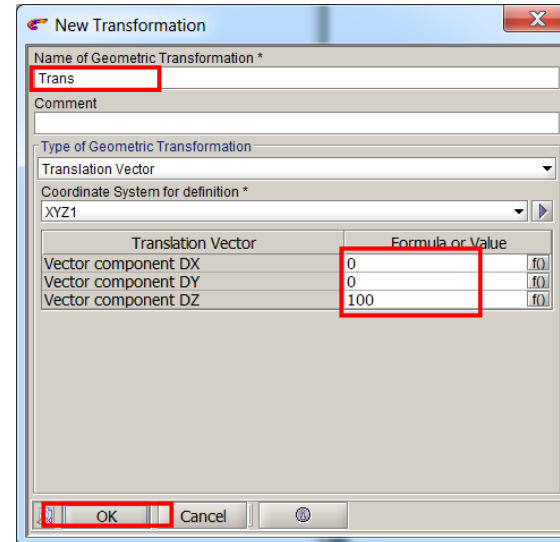
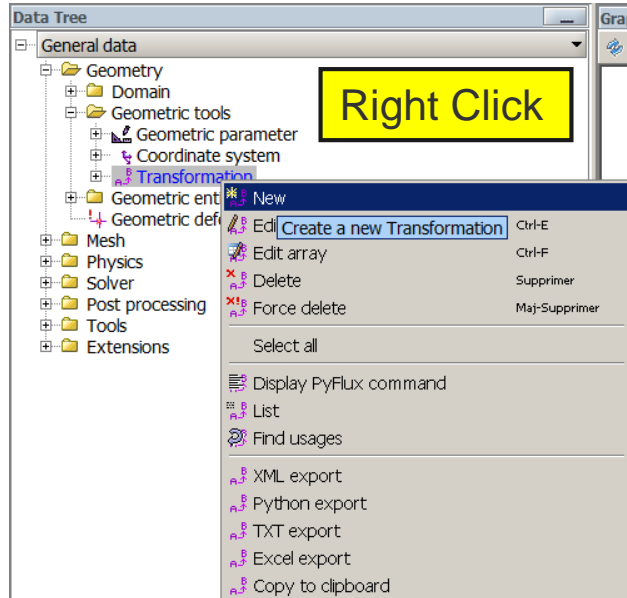
Import the 2D geometry ( in Flux 3D)



# Create the geometry

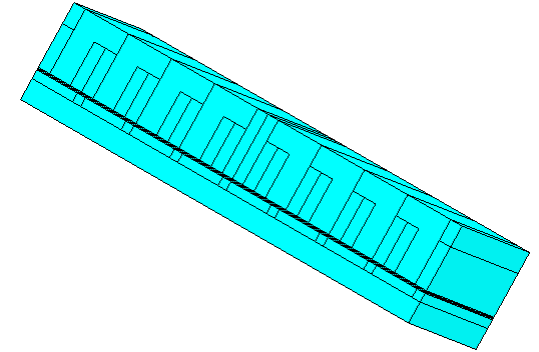
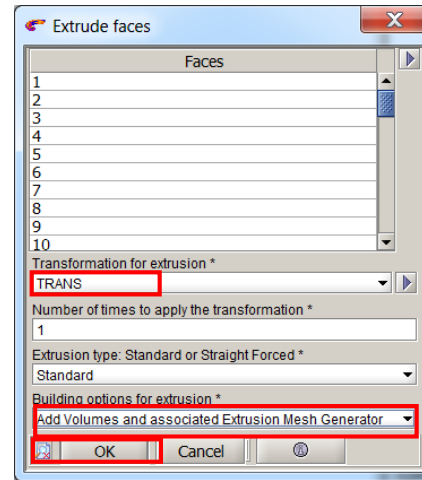
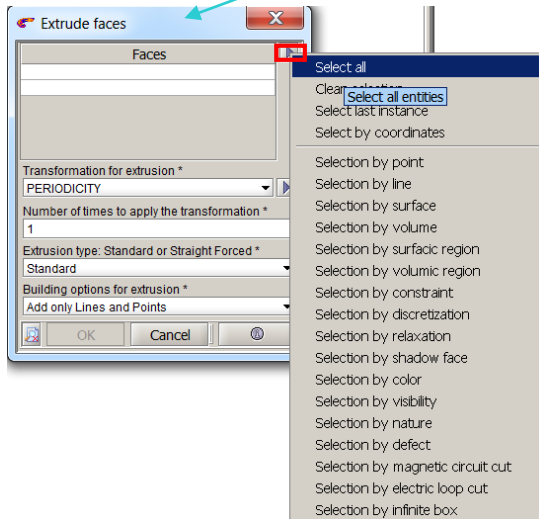
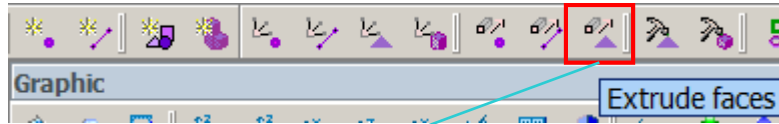
Extrude the face to create 3D project

- Create a transformation



# Create the geometry

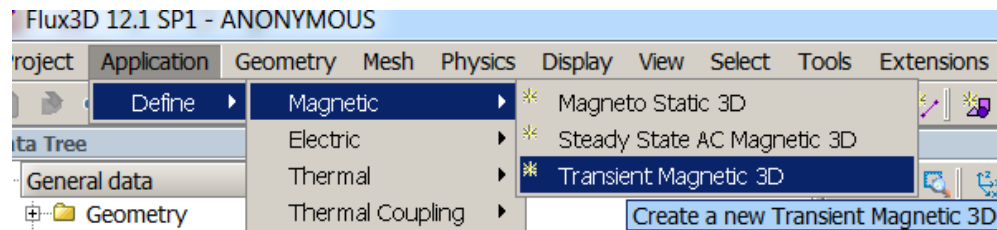
Extrude the face to create 3D project



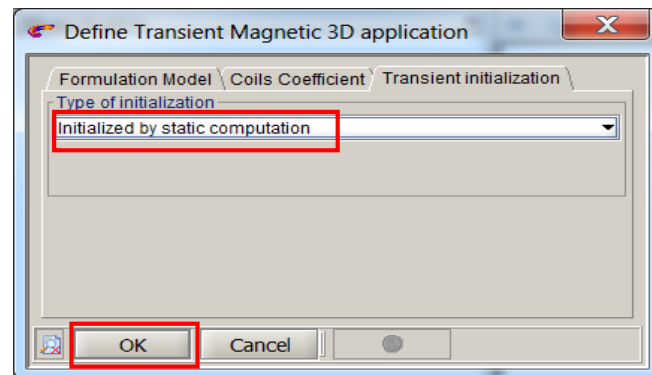
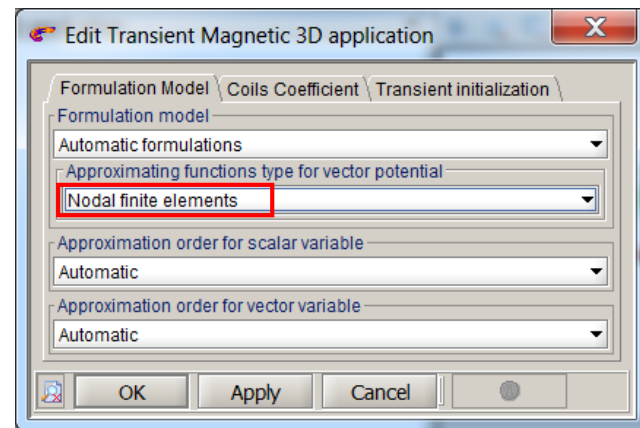
Save the Project: GEMO.FLU

# Physics: application

## Create application



Click on OK



# Physics : create magnetic materials

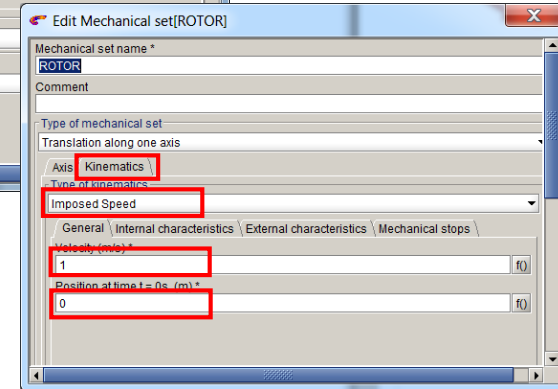
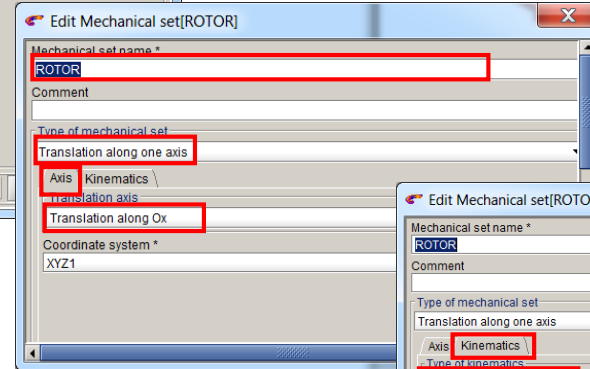
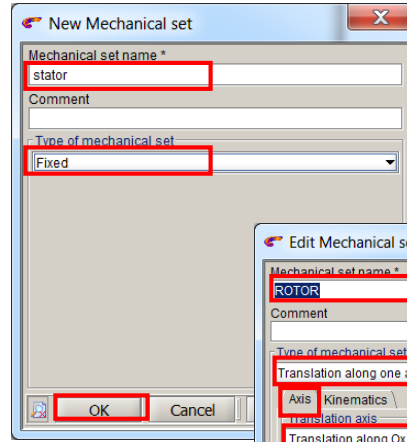
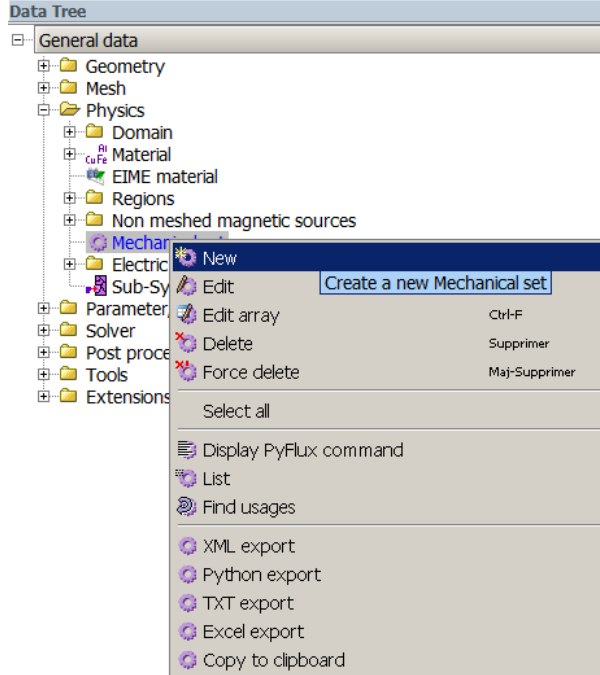
## Import and create material

The process involves three main steps:

- Accessing the Material Creation Options:** In the **Data Tree**, navigate to **Physics** > **Domain** > **Material**. The **New** button is highlighted, leading to the **New Material** dialog.
- Configuring the New Material:** In the **New Material** dialog, set the **Name of the material** to **MAGNET**. Under **Magnetic property**, select **Linear magnet described by the Br module**. The **Remanent flux density (T)** is set to **1.23** and **Relative permeability** is set to **1.05**.
- Importing an Existing Material:** The **Import material .DAT** dialog is shown, listing various materials. **FLU\_M330\_35A** is selected from the list. The **Import** button is highlighted, with a note to **Click on OK**.

# Physics : create mechanical sets

## Stator and rotor

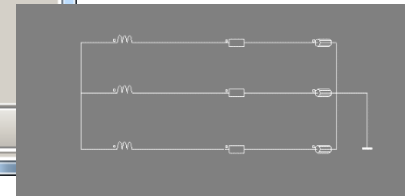
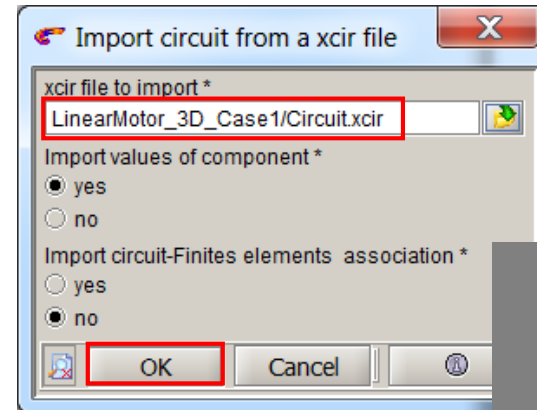
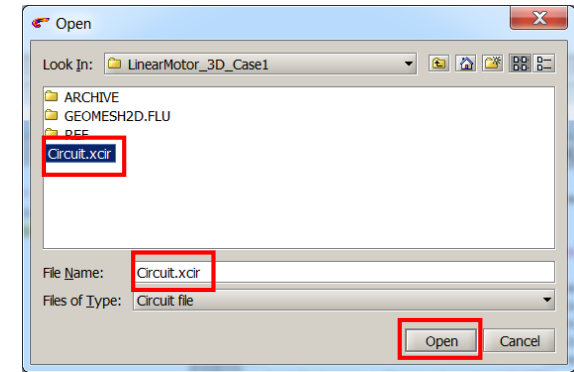
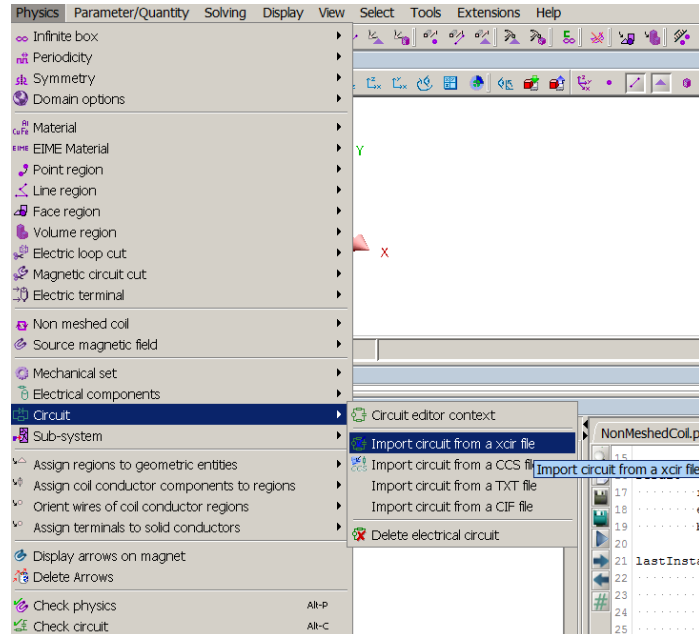


Click on OK

# Physics : circuit

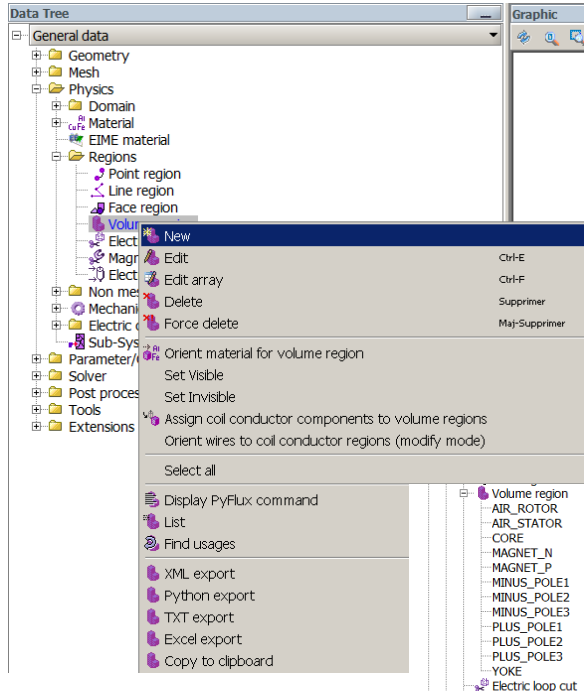
## Create circuit

- Load the file: 'Circuit.xcir'



# Physics : volume regions

## Create volume regions



Volumes regions	Nature	Material	Mechanical sets
YOKE	Magnetic non conducting region	FLU_M330_35A	Rotor
AIR_Rotor	Air or Vacuum	Air or vacuum	Rotor
Magnet_P	Solid conductor	Magnet	Rotor
Magnet_N	Solid conductor	Magnet	Rotor
Core	Magnetic non conducting region	FLU_M330_35A	Stator
AIR_Stator	Air or vacuum	Air or vacuum	Stator

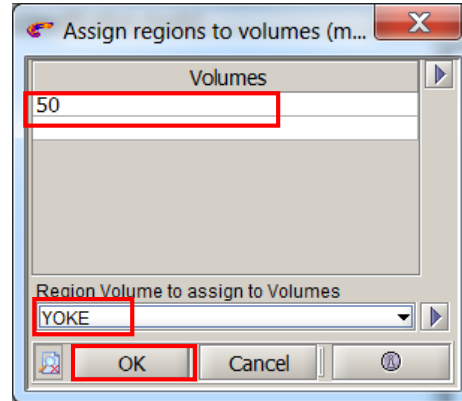
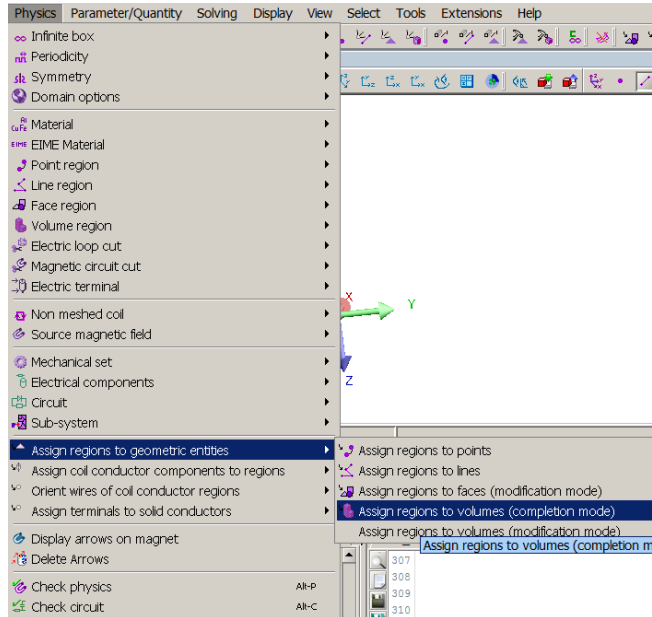
# Physics : volume regions

## Create volume regions

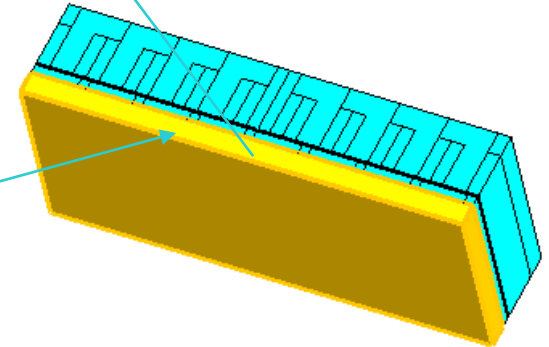
Volumes regions	Nature		Mechanical sets
PLUS_POLE1	Coil conductor region	Component: BPA Number of turns: 1500	Stator
PLUS_POLE2	Coil conductor region	Component: BPB Number of turns: 1500	Stator
PLUS_POLE3	Coil conductor region	Component: BMC Number of turns: 1500	Stator
MINUS_POLE1	Coil conductor region	Component: BPA Number of turns: 1500	Stator
MINUS_POLE2	Coil conductor region	Component: BPB Number of turns: 1500	Stator
MINUS_POLE3	Coil conductor region	Component: BMC Number of turns: 1500	Stator

# Physics : volume regions

Affectation of the volumes to the volume regions



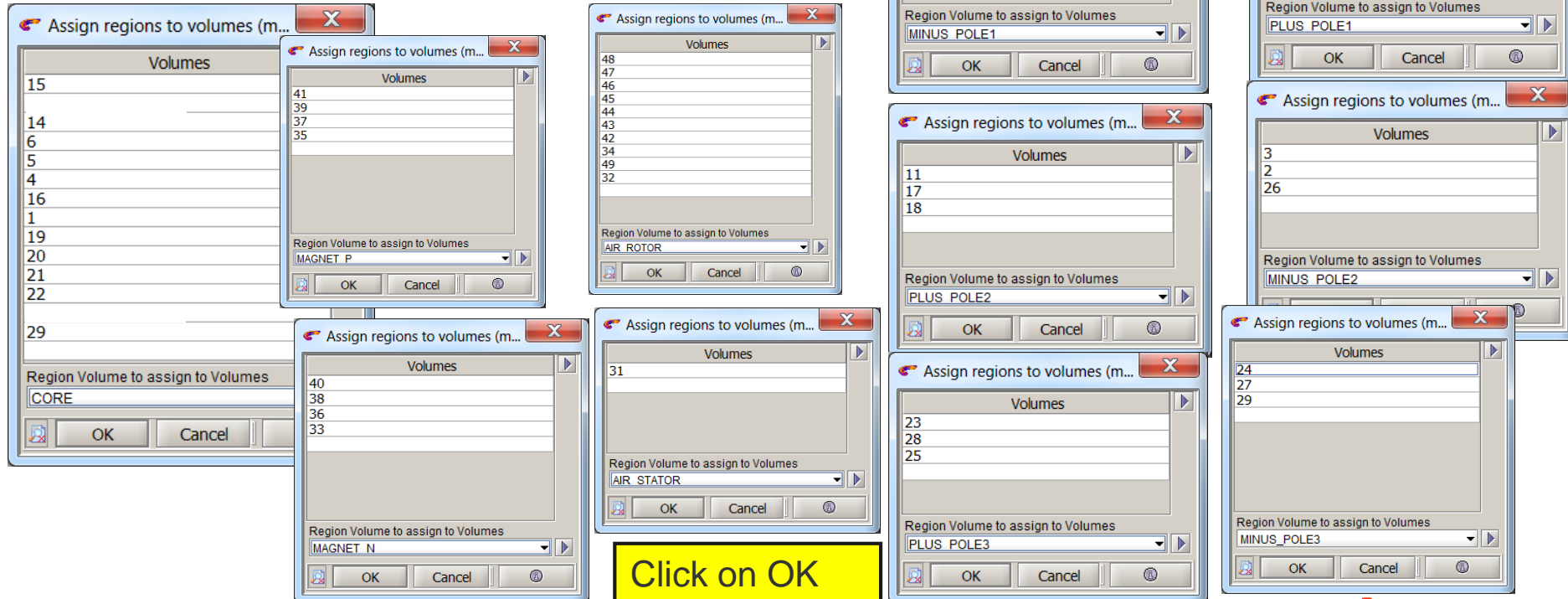
Select the volume region



Click on OK

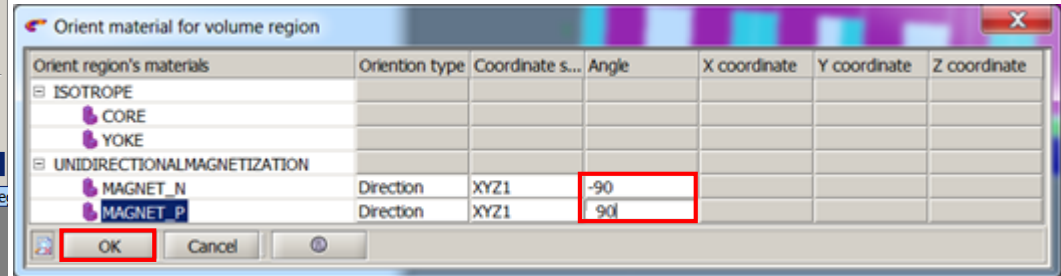
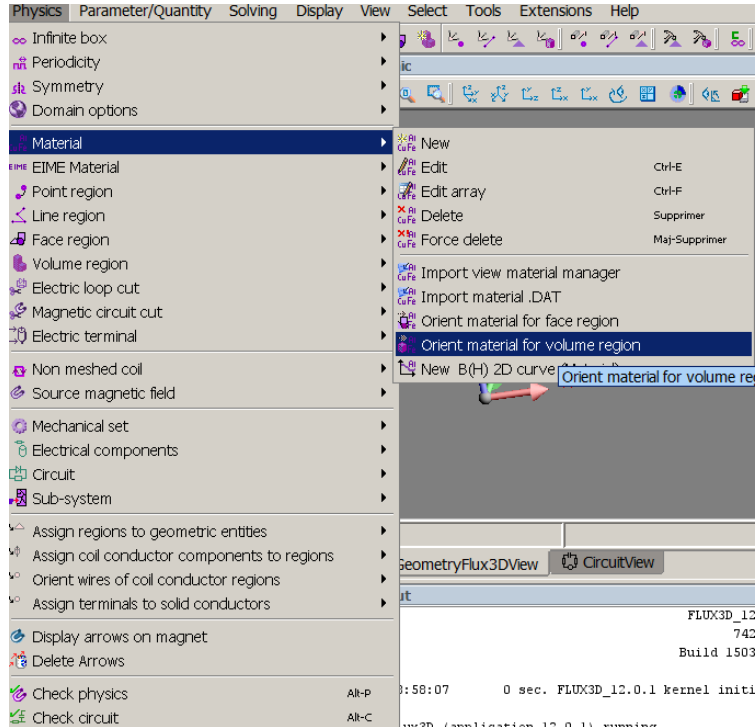
# Physics : volume regions

Affectation of the volumes to the volume regions



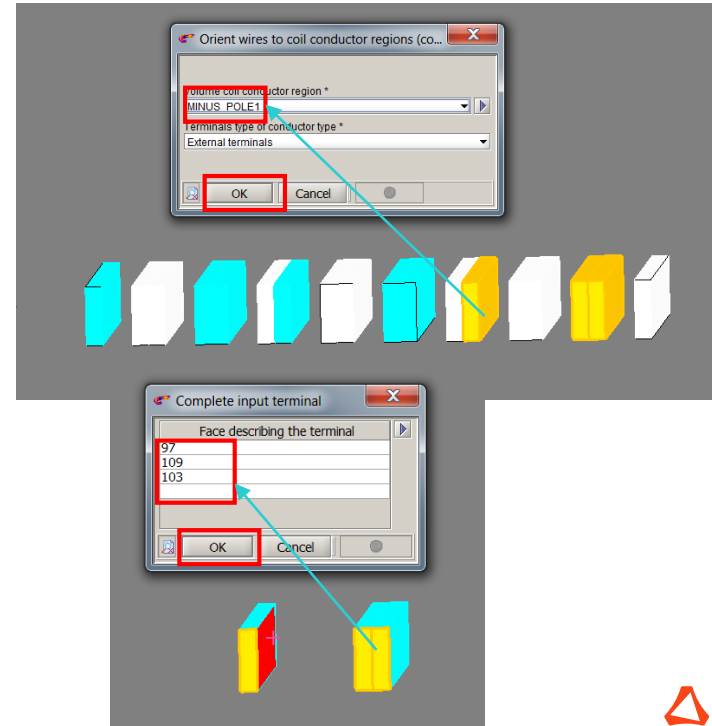
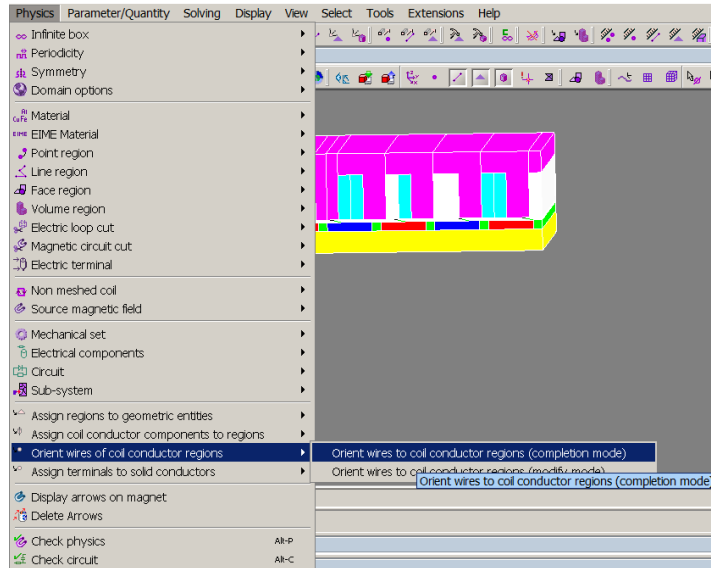
# Physics : volume regions

## Magnets orientation



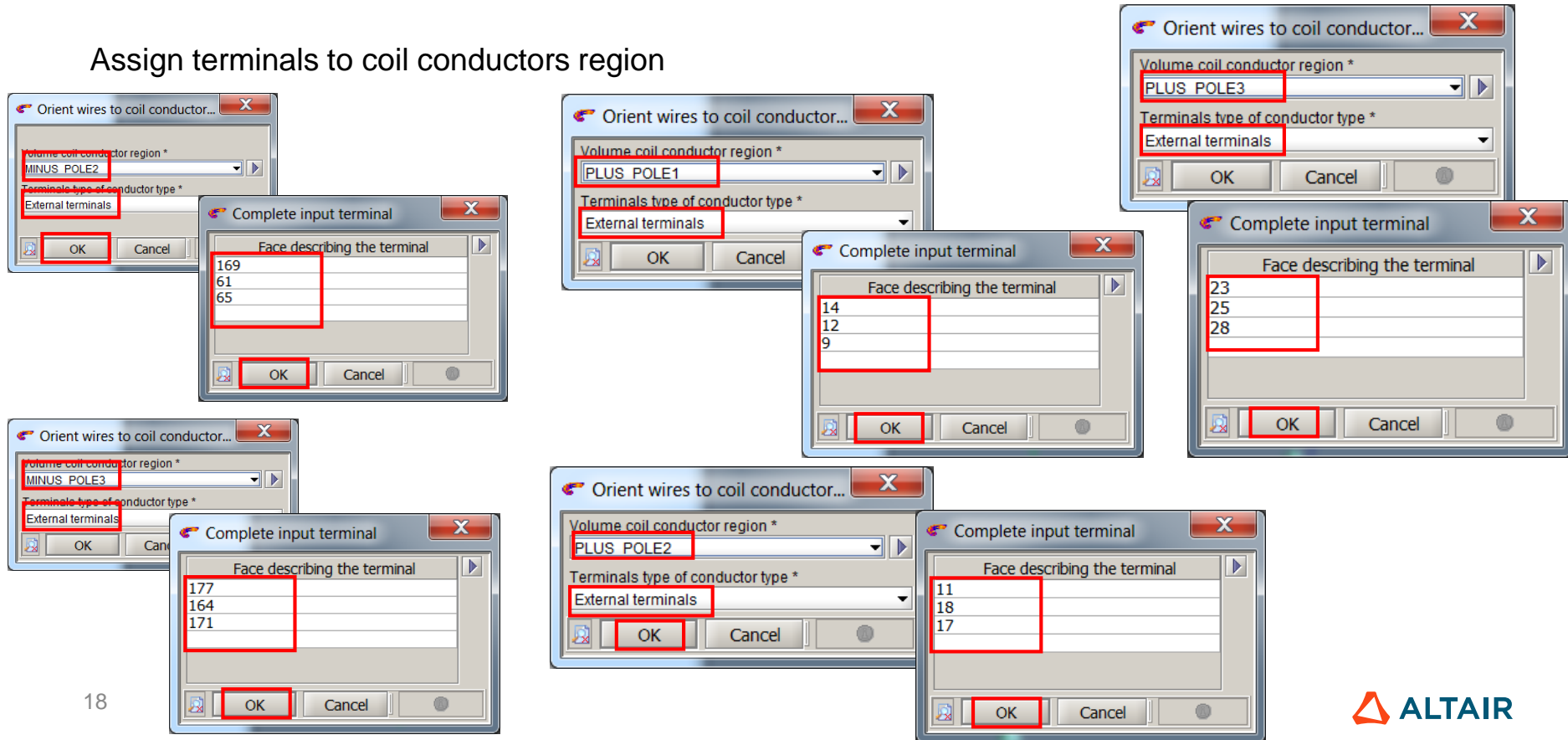
# Physics : volume regions

## Assign terminals to coil conductor region



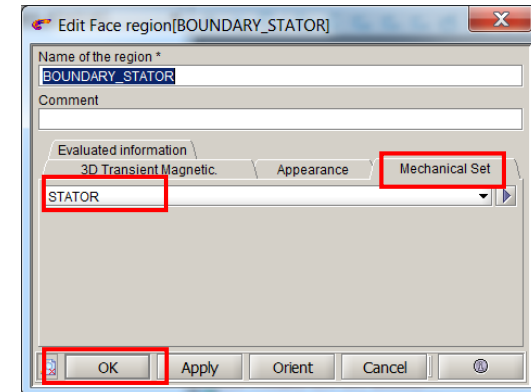
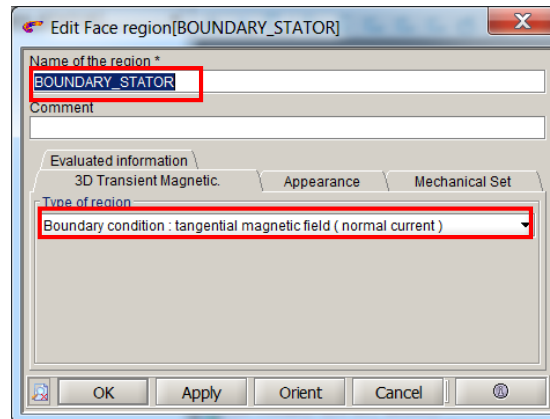
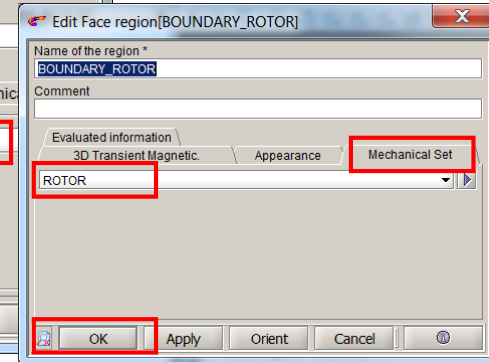
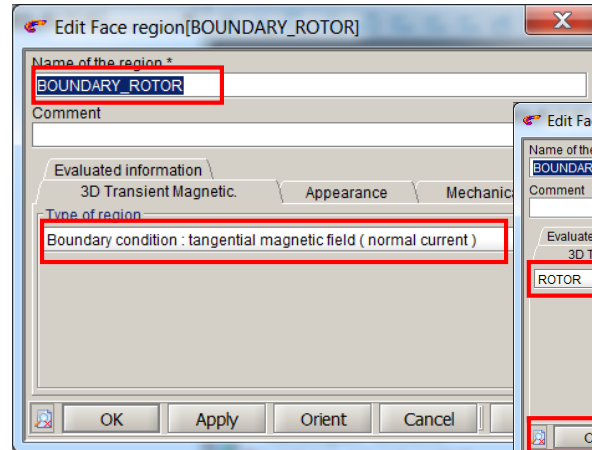
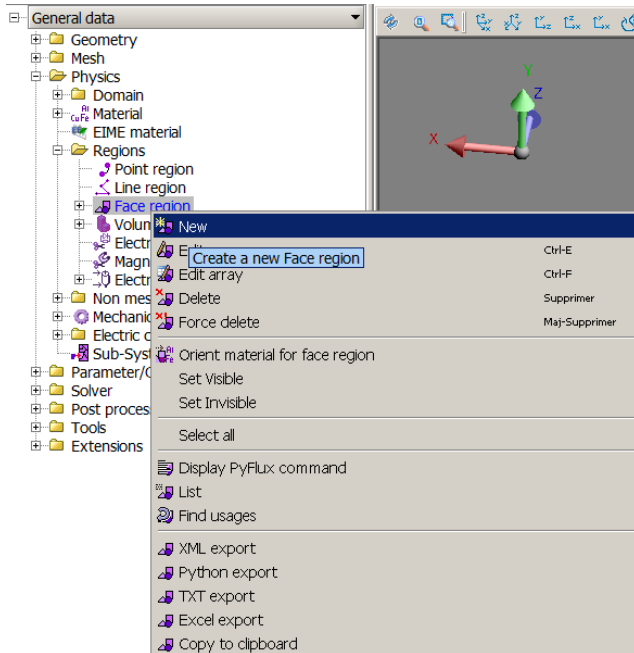
# Physics : volume regions

Assign terminals to coil conductors region



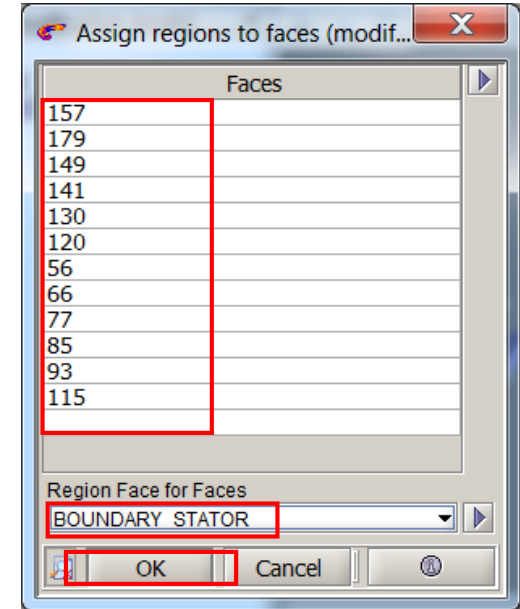
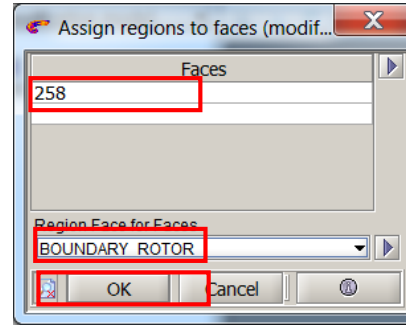
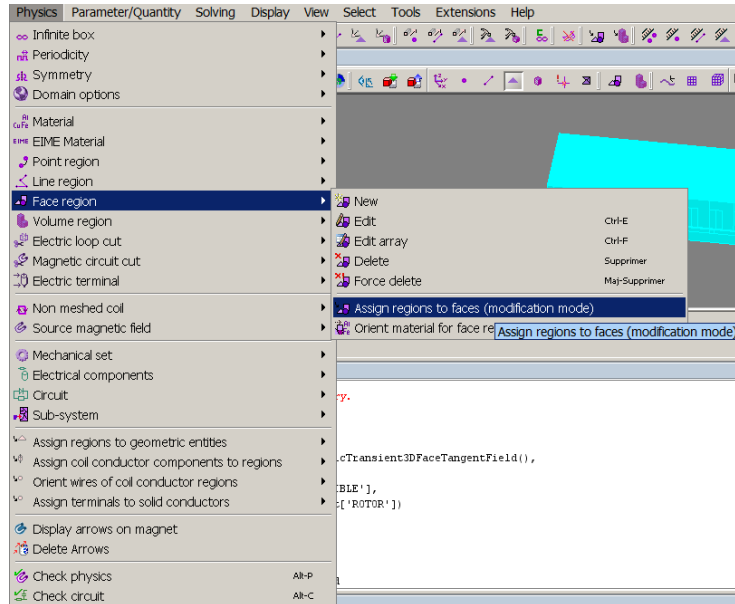
# Physics : boundary condition

## Create boundary condition



# Physics : bondary condition

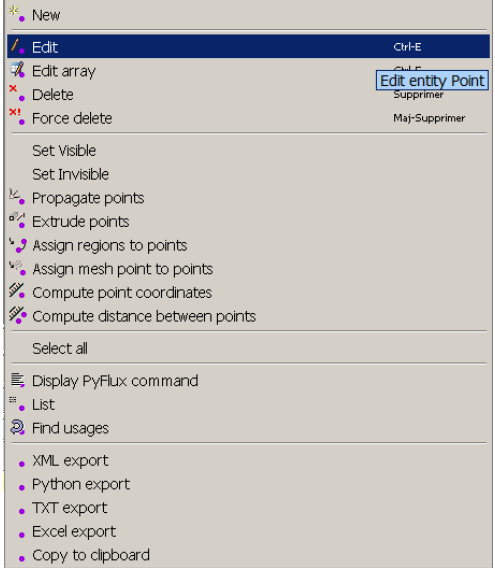
## Assign boundary condition



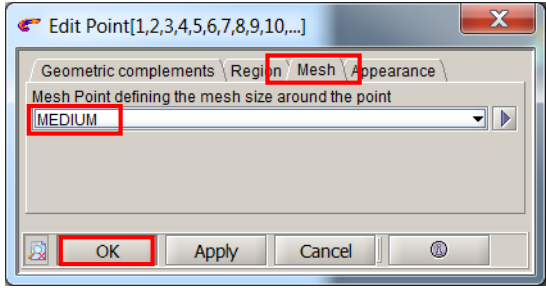
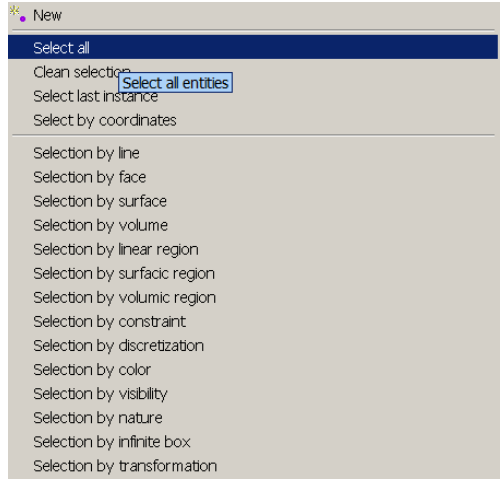
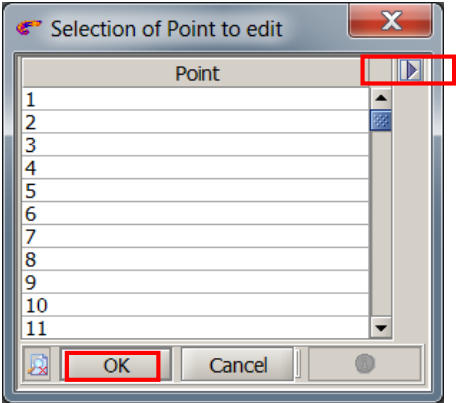
Save Project: GEOM.FLU

# Mesh : mesh domain

## Mesh device



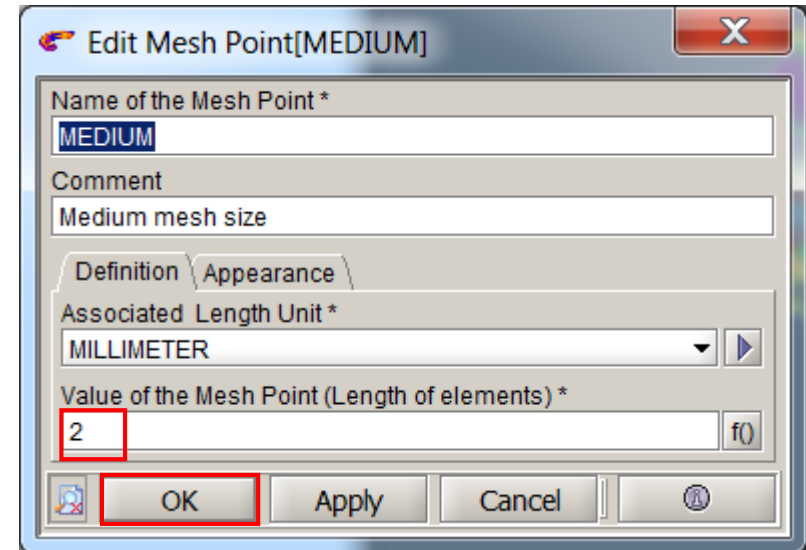
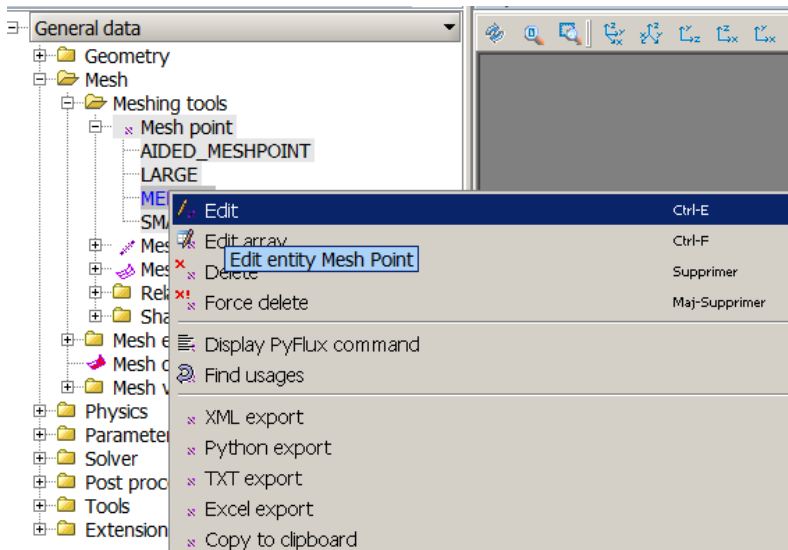
Right click on the window graphic



# Mesh : mesh domain

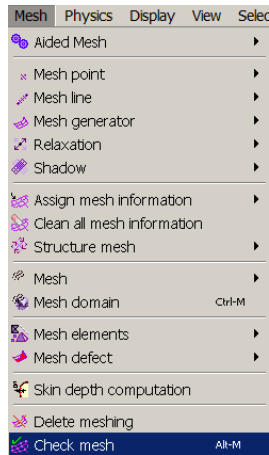
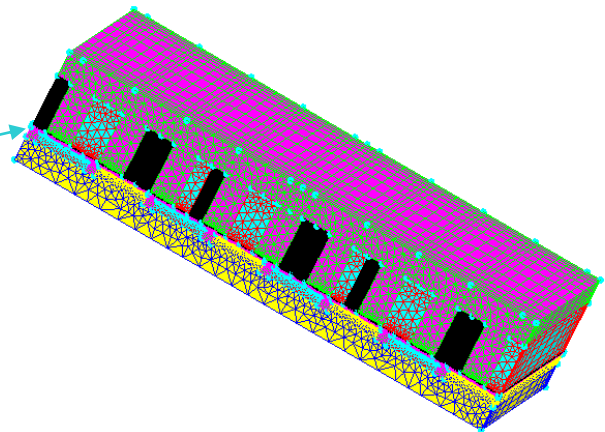
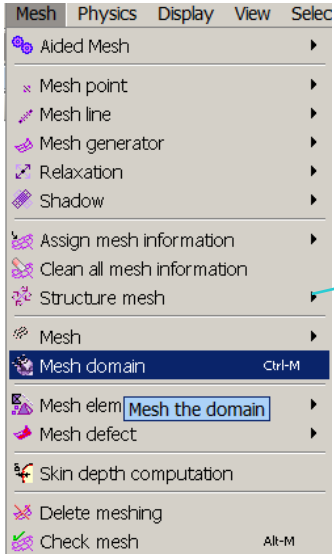
## Mesh device

- Change mesh point (medium)



# Mesh : mesh domain

## Mesh device



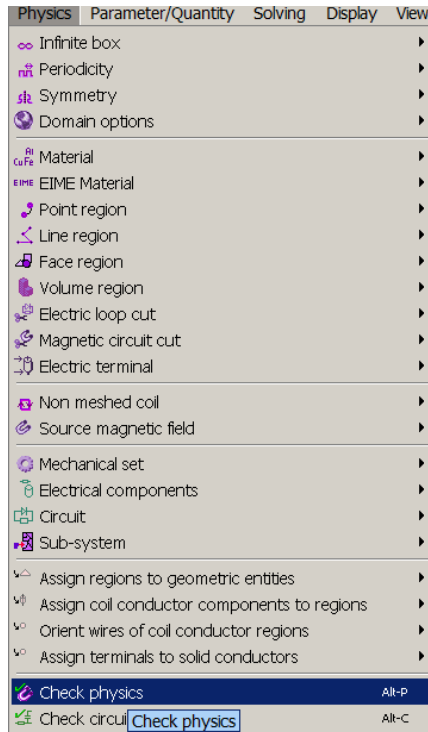
Volume elements :

Number of elements not evaluated	: 100 %
Number of excellent quality elements	: 0 %
Number of good quality elements	: 0 %
Number of average quality elements	: 0 %
Number of poor quality elements	: 0 %

Number of nodes : 79118  
Number of line elements : 6842  
Number of surface elements : 58824  
Number of volume elements : 146368  
Mesh order : 1st order

# Physics : check physic

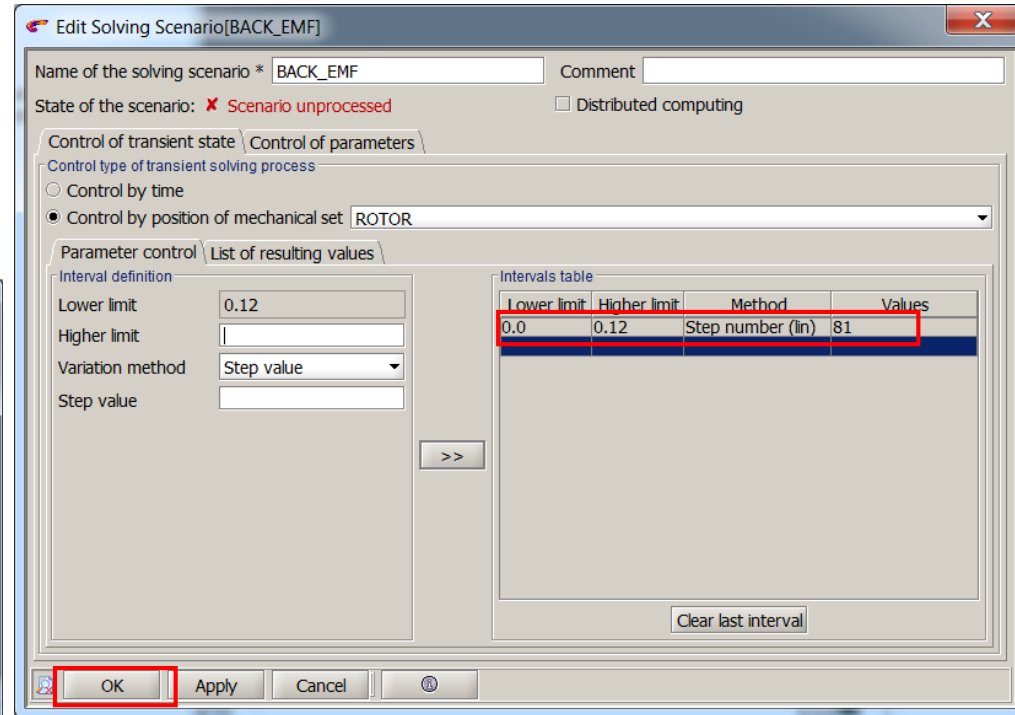
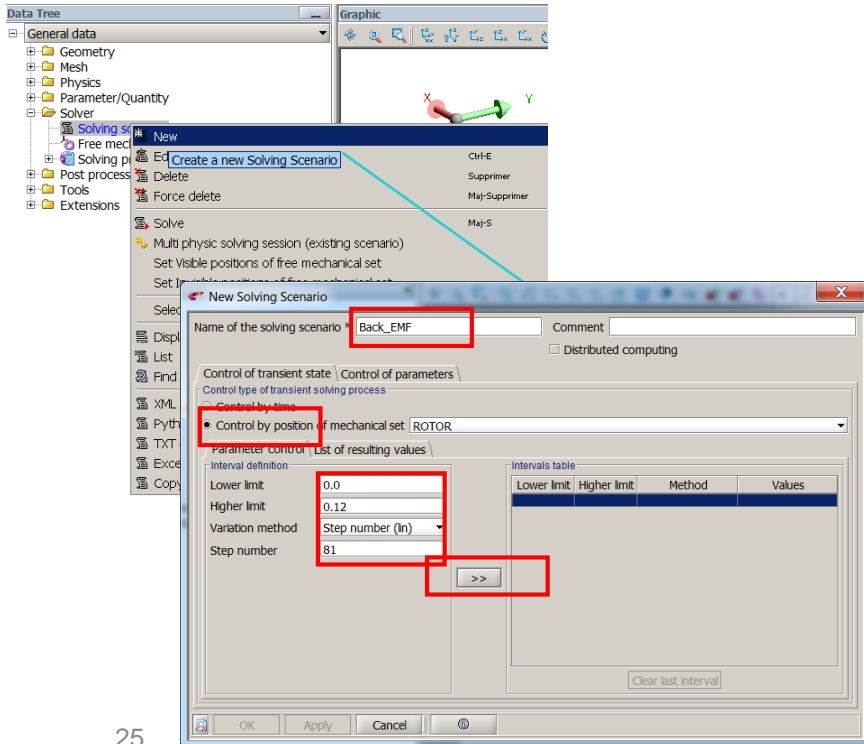
## Check physic



Save Project: GEOM\_MESH.FLU

# Solving

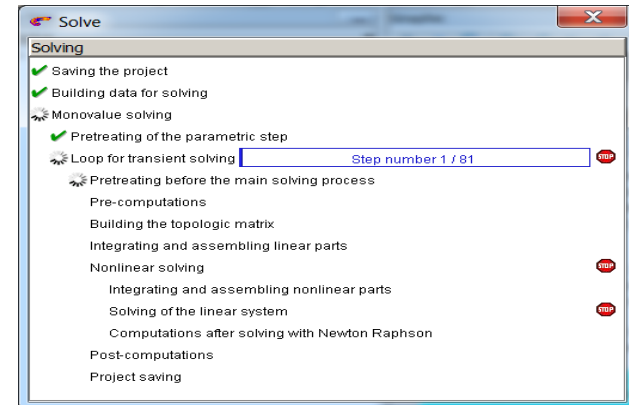
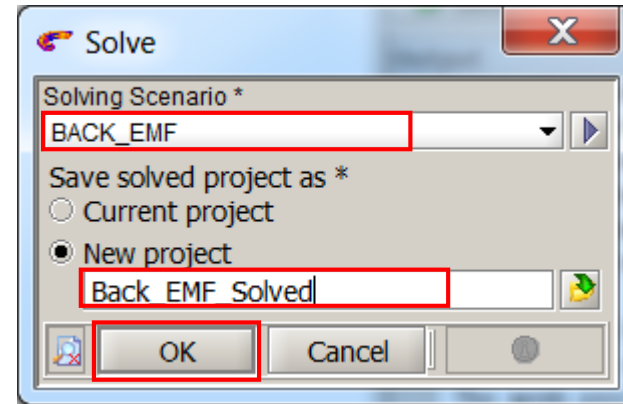
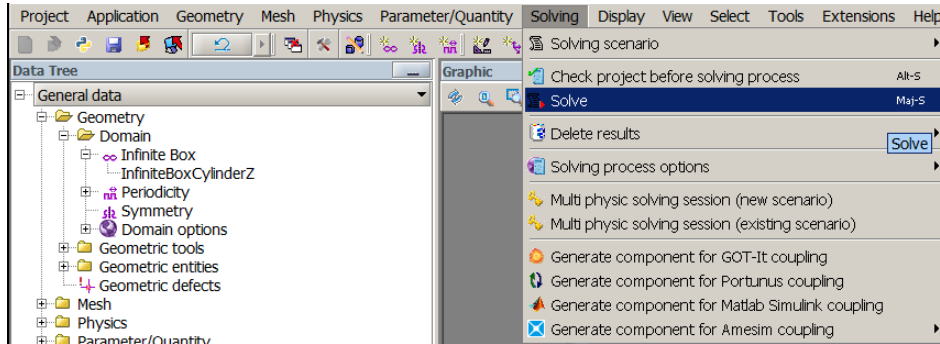
Create solving scenario to compute back EMF



# Solving

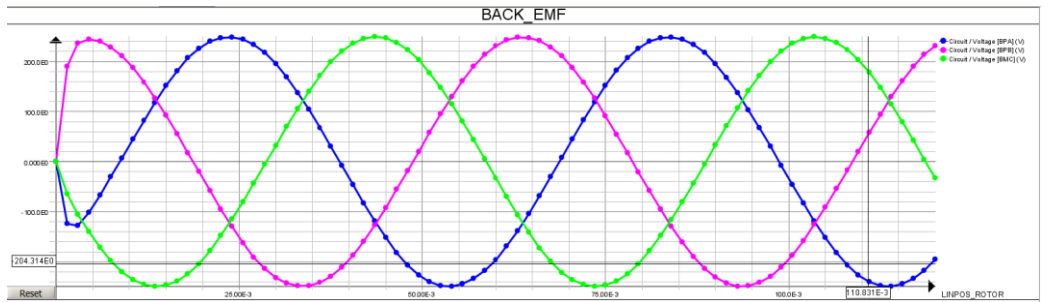
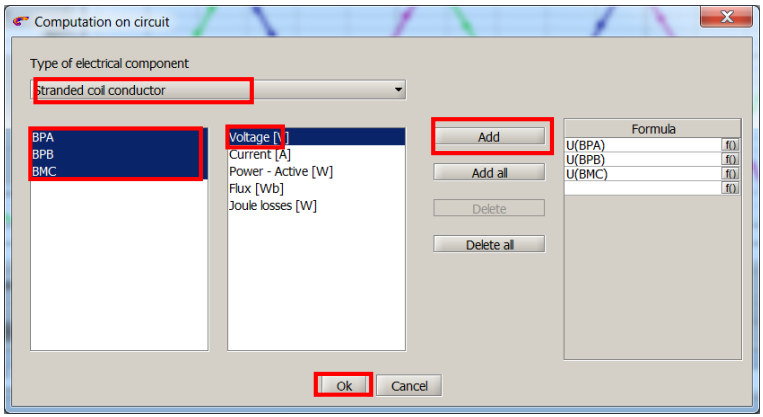
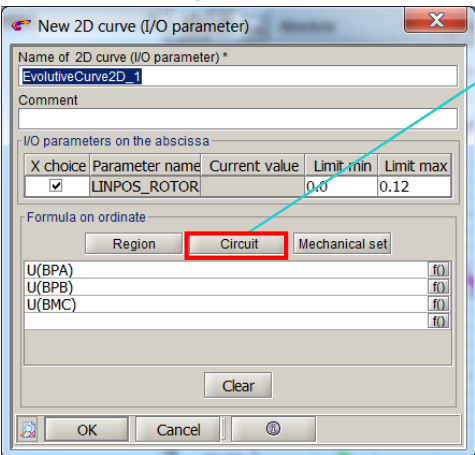
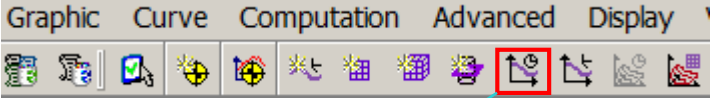
Create solving scenario to compute Back EMF

- Solving



# Post processing

## Back EMF





# THANK YOU

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#ONLYFORWARD