Flux Activate coupling - Translating motion

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

Introduction

This document describes Flux-Activate coupling on the example of translating motion.

Keywords

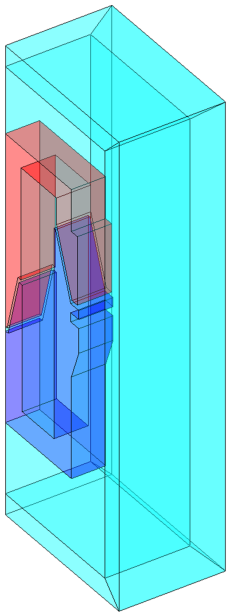
Applications	Flux main functions
• Transient Magnetic	• Co-Simulation • Translating motion

Studied device

This document deals with a demonstration of the software Flux3D coupled to Activate for the modeling of a translating motion.

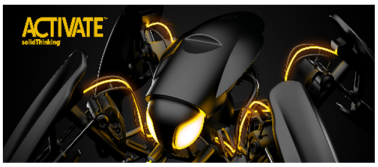
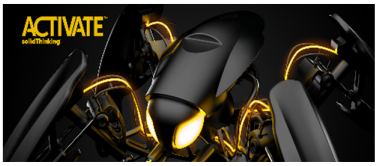
One transient computation is already done to compute the position of the plunger in function of the time, with the coil supplied with constant voltage. In parallel, the current in the coil is analyzed.

Then, by using Flux coupled to Activate, a regulation (by hysteresis) of the current in the coil is simulated.



Aim

The aim of this coupling is to do a cosimulation between Flux and Activate. Activate serves to make the system part.

Action	Software
Device modeling	Altair Flux™
Generate the coupling component for Activate	Altair Flux™
Create the Flux connector	
Solve the problem	

Steps

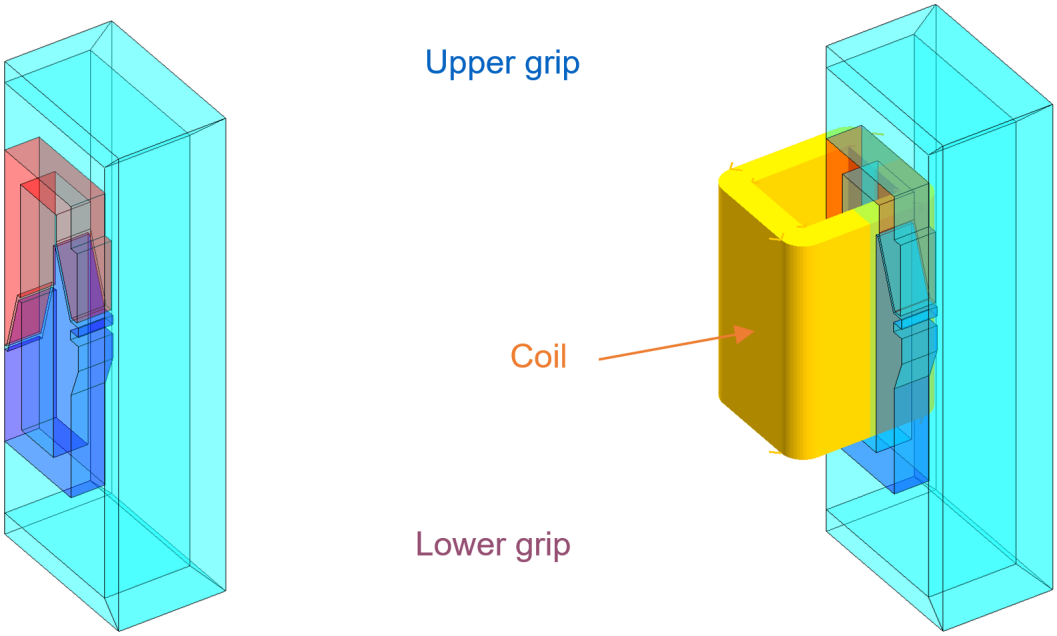
The different steps to realize this coupling are shown in the table below:

Phase	Software	Description
1	Flux	Flux project preparation: • Model description: geometry, mesh and physics • Specific description: creation of the input/output parameters required for the coupling • Generate the coupling component for Activate
2	Activate	Activate opening: • Preparation of the Activate model
3	Activate / Flux	Solve the problem
4	Activate / Flux	Post Processing

Flux model

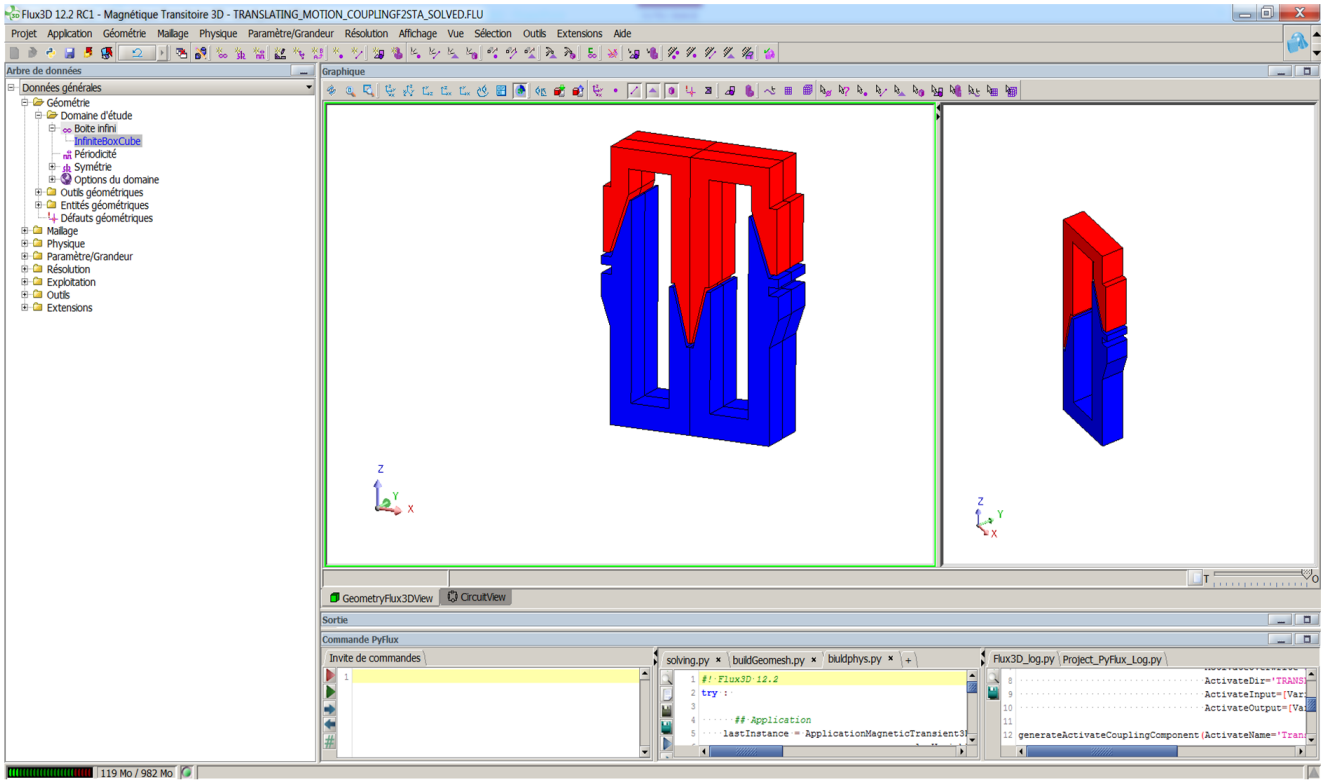
The first step is to prepare the Flux project:

- The geometry, mesh the device and the physics description (materials, regions, non-meshed coils, mechanical sets…) and circuit
- We create the input and output parameters that we use to generate the coupling element between Flux and Activate
- Generate the coupling element



Detailed steps

In the first step we create the geometry, mesh and physics. To do it, we open the project: `Translation_Motion_Coupling.FLU`.



We create input and output parameters.

1. Inputs:

   Multi-Physical I / O Parameters

   This allows, via formulas to pilot:

   Physical quantities: μr, Bs, Br ...

   Electrical quantities: resistance, voltage, current ...

   Mechanical quantities: position, speed, resistant force, resistive torque ...

2. Outputs:

   Scalar I / O Settings

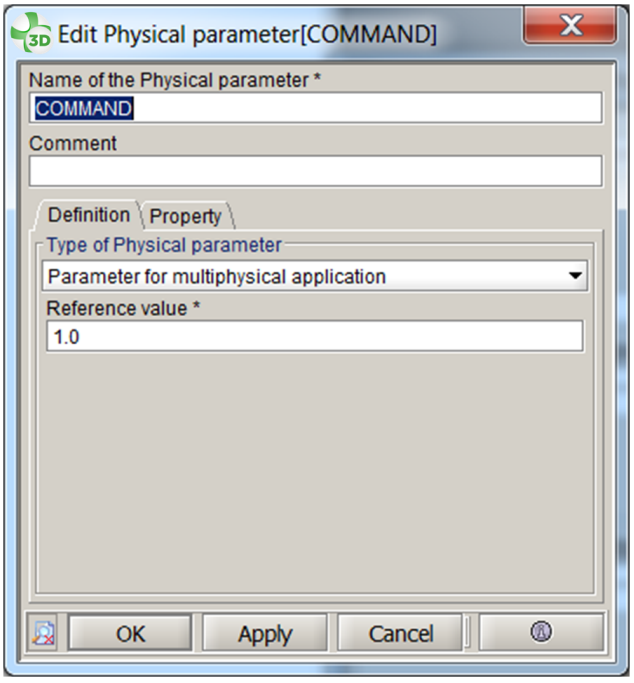
   This allows, via sensors, formulas, parameters to retrieve the values:

   Of sensors

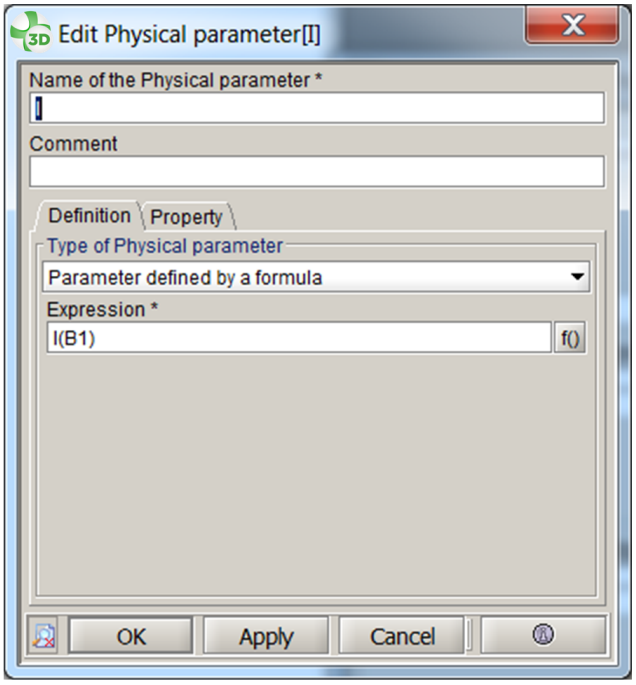
   Of forces, couples ...

   Positions, speeds, accelerations ...

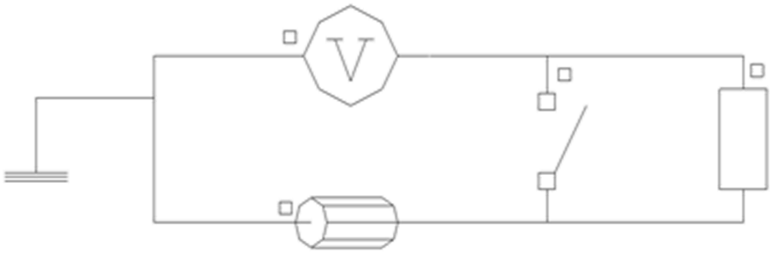
- Input



- Output



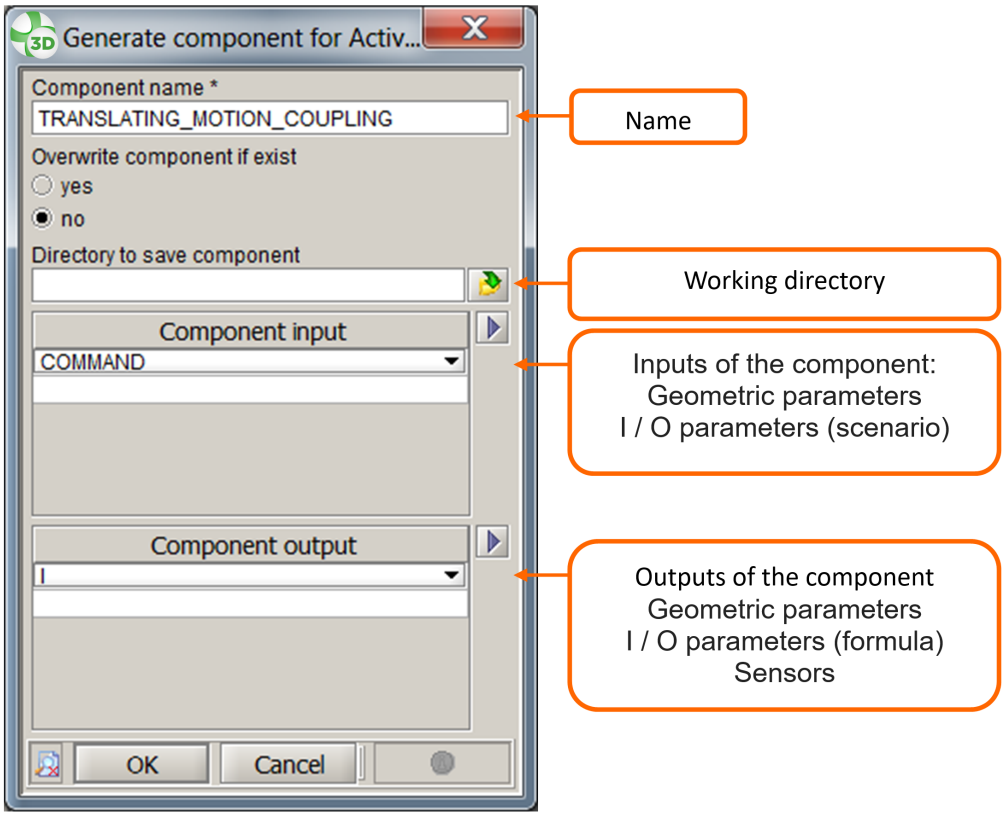
The electrical circuit is defined as:



It is composed:

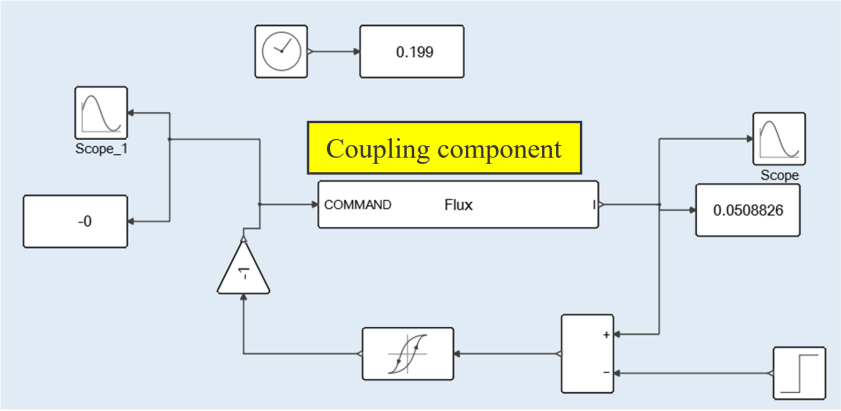
- Voltage source
- Coil conductor
- Resistor
- Switch

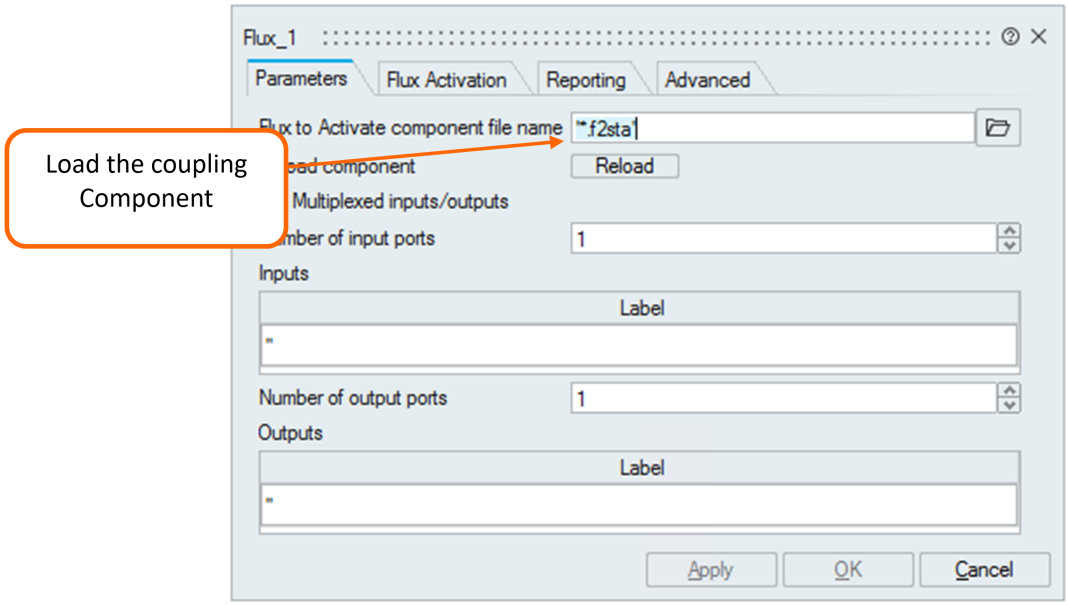
Generate component (**Solving** > **Generate component for Activate coupling**) for Activate coupling in the same working directory.



Activate model

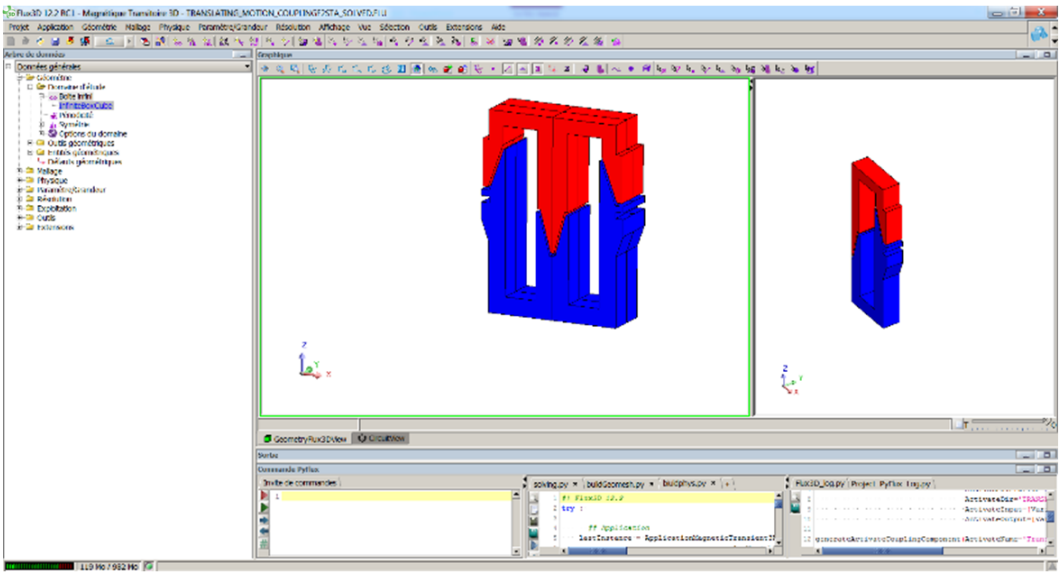
The user must prepare the Activate model by adding and characterizing the coupling block but also the blocks needed to build the desired model.

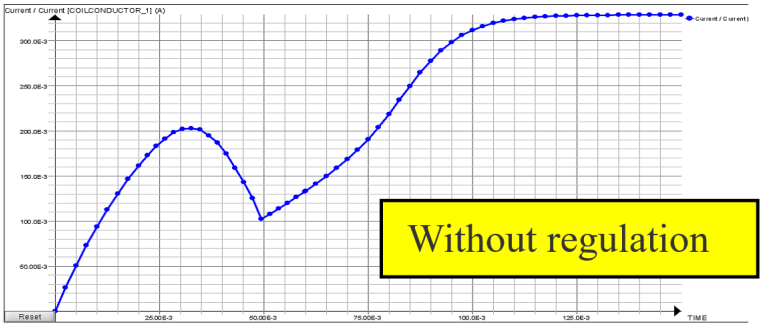




Simulation results

Flux 3D model





Activate model