CEDRAT Software suite improved thanks to Flux/Portunus Co-simulation. *Bertrand du Peloux - CEDRAT Group.*

Taking into account the effects of system load or improving its drive is now easier thanks to **Flux/Portunus co-simulation**.

With version 10.3 of Flux, it is now possible to export finite element models into a system environment that will perform co-simulation.

Co-simulation works for **both 2D and 3D applications** within Flux 10.3 and there is virtually **no limit to the parameters** that can be shared between the two programs.

Benefits range from the study of load impact (as well mechanical or electrical loads, thermal effects, etc…) to the design of complex drives.

Because Portunus is a multi-domain system simulation software, modelling within the same simulation sheet a **complete mechatronic system** is made easy.

Kirchhoff representation (analogue signals) can be used in parallel with signal flow (block diagrams) and digital signals (state machines, logical statements, etc…).

Furthermore, this complete environment has been enhanced with the **support of the VHDL-AMS standard** which opens up numerous modelling capabilities.

Thus, co-simulation between Flux and Portunus means that **the designer is now able to combine all these modelling approaches with finite element models!**

By way of example, figure 1 shows the results of a rated speed study of a permanent magnet machine with its inverter and drive.

The benefits for the designer who is able to model the whole chain with appropriate methodology and models are obvious: the inverter is built with electronic components whereas the control of the semi-conductors uses logical state-machines. The electrical machine is set up using the BPM overlay of Flux, and is easily plugged into Portunus using the co-simulation interface (simple file import).

Because several dynamics can be found in a system, and to help the designer to handle different time constants, the coupling interface comes up with **several co-simulation algorithms** that can be parameterized according to the case study needs:
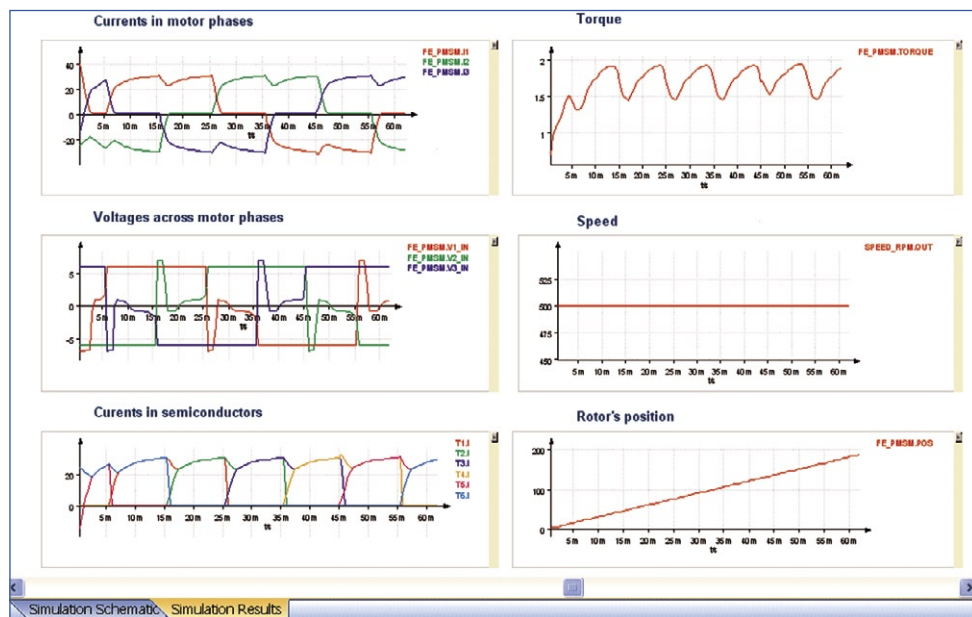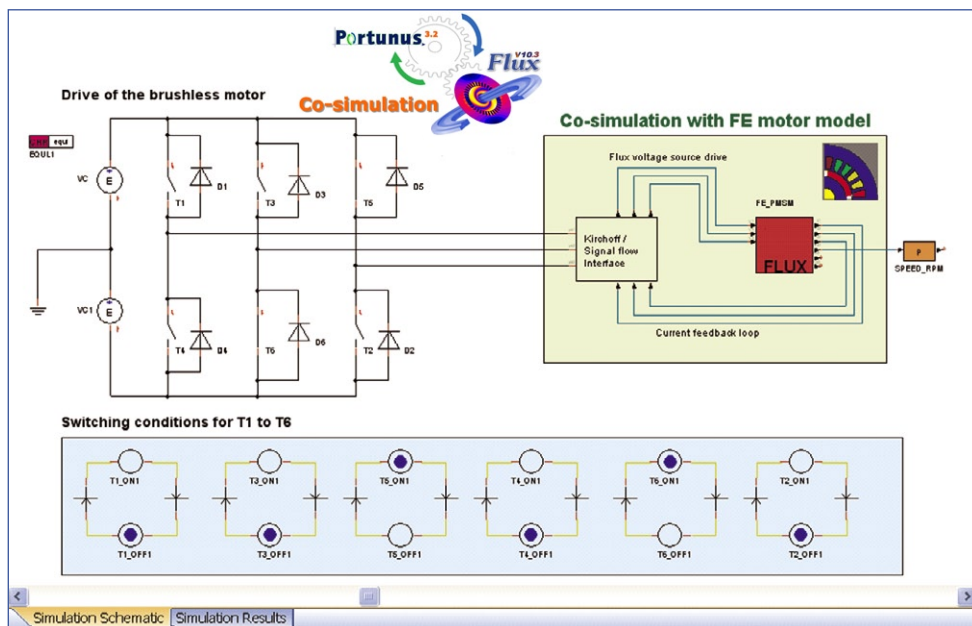
》》 Step time management
》》 Software synchronization
》》 Data extrapolation and input variation criteria
》》 Signals decoupling thanks to delay insertion

This improves simulation time given the accuracy required or the nature of the system (its dynamics, if included in an open or closed loop, etc…)

Communication between our finite element software Flux and our system simulator Portunus should remove simulation or modelling roadblocks and open up new fields of exploration.

Evaluate our new Portunus software at: http://www.cedrat.com/en/software-solutions/downloads/portunus-demo-version.html.