

On InCa trail... (continued)

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- For impedance computation:
 - export of the impedance matrix,
 - export to SABER (MAST files).

So far, InCa has two main limits:

- All materials have a relative permeability equal to 1.
- Conductors are normal or parallel to each other.

Applications

InCa has been used for several applications. One application example is the study of currents in bus bars. This study, carried out by LEG (Laboratoire d'Electrotechnique de Grenoble) and MGE-UPS (Uninterruptible Power Systems manufacturer), led to the optimisation of current waveform in the power module, changing the connection in this power module (see figure 4). A second example (see figure 5)

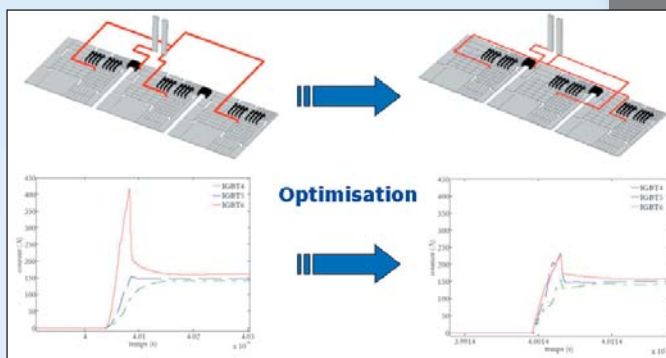


Figure 4: optimisation of current waveform in the power module.

is the study of current density in distribution bars (made for Schneider Electric). In this instance, the goal was to reduce Joule losses by varying the position of the bus bars. Taking into account temperature and skin effect, losses in the distribution bars could be reduced by 25 %.

On the market

InCa's first integrated release will be on the market by summer. Please ask software@cedrat.com any question about this new product.

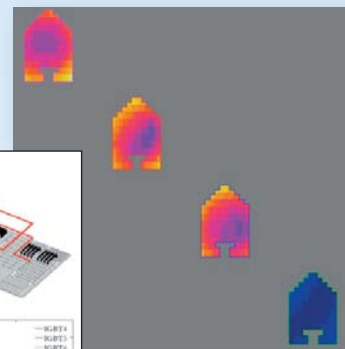
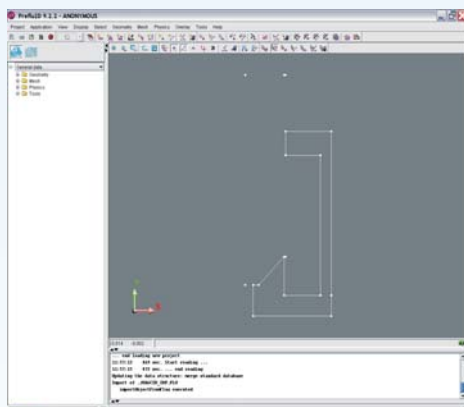
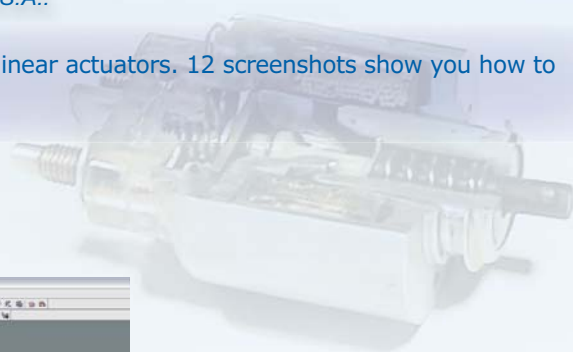


Figure 5: Current distribution in the bars.

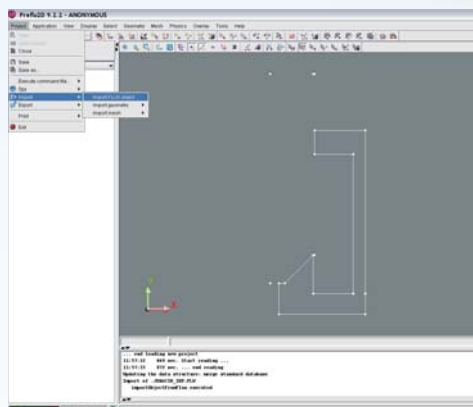
How to: Run an electromagnet simulation with FLUX.

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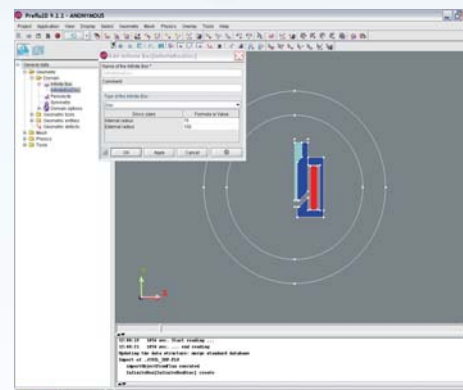
Through a series of pictures, you will be given a tutorial dedicated to linear actuators. 12 screenshots show you how to run an electromagnet simulation with FLUX.



Geometry: Points can be parameterised so that the parameters can be modified later on.



Geometry: But you can also complete the geometry importing objects you have already created (import with mesh and parameters).

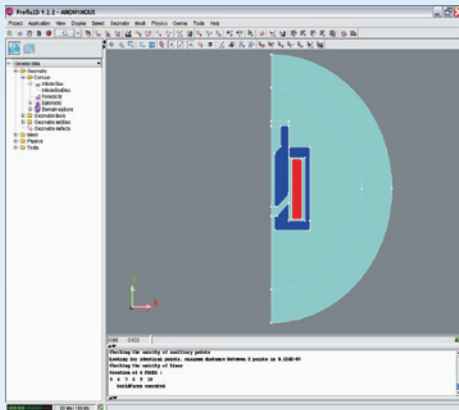


Geometry: The domain can be closed with an infinite region.

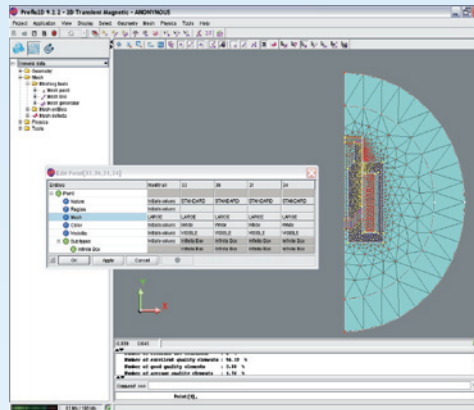
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How to: Run an electromagnet simulation with FLUX. (continued)

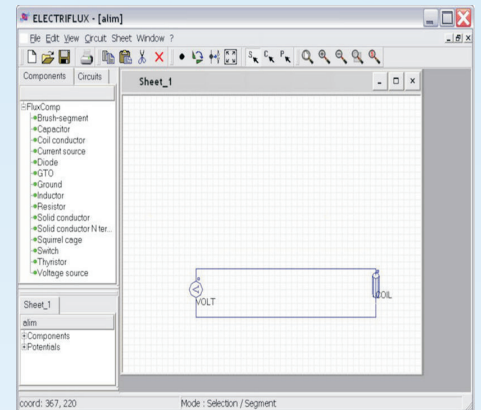
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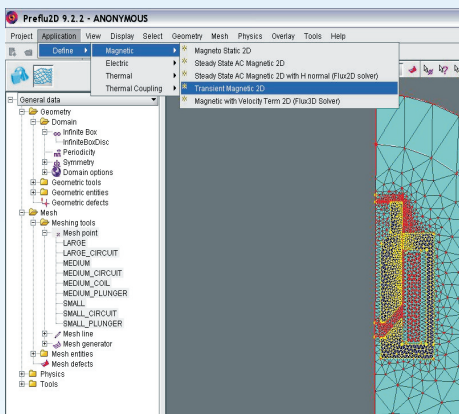
Geometry: With a Y axis symmetry, the geometry is complete.



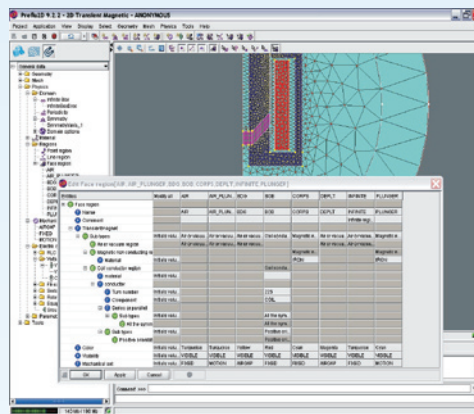
Mesh: As the imported objects also contain mesh and parameters, the mesh means feeding information into the infinite box.



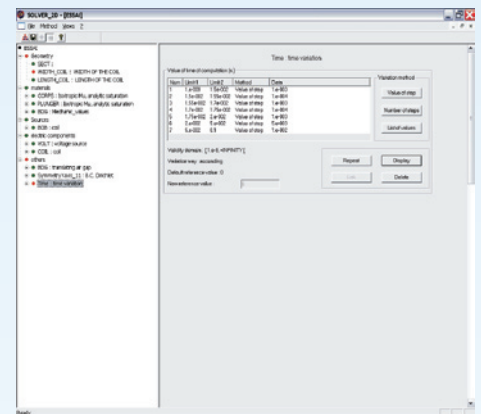
Electrical circuit: Any electrical circuit can be connected to supply the electromagnet. A very simple supply is shown here, but you could add also capacitors, inductances, switches, diodes,...



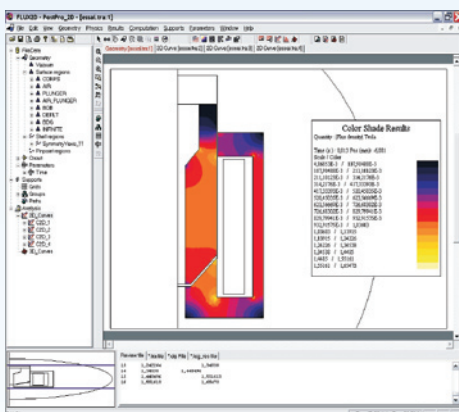
Physics: We will carry out a transient magnetic simulation to see how the plunger moves.



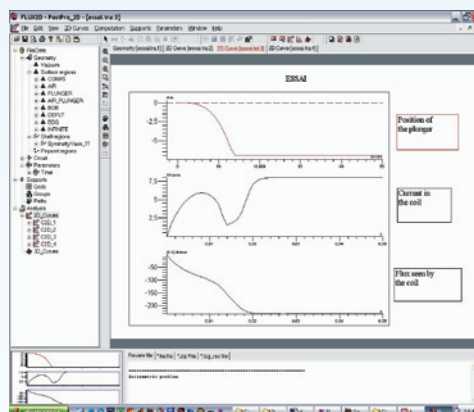
Physics: All regions may be defined at the same time using the "edit array" command (right click).



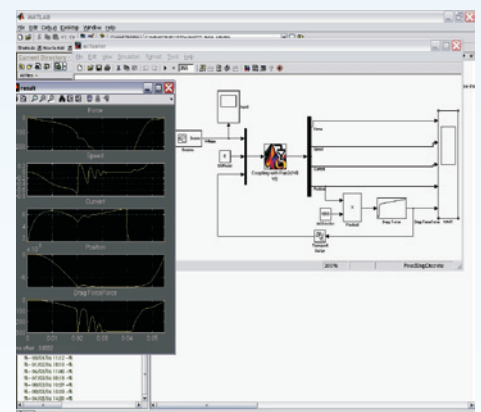
Solving: Time is the main parameter, but other parameters may be varied (with red dots on the picture) for a transient multi-parametric computation.



Results: Color shades can show induction distribution in magnetic parts, for example.



Results: Of course, many plots can be obtained: positions giving closing time, current and flux in the coil...



Co-simulation with Simulink: For complex supply or to account for non-linear drag force, Simulink is the ideal solution to run FLUX easily.

Some of our references for this application are:

Actaris, AEMF, Asco Joucomatic, Borg Warner, Celestion, CNES, Delphi, Densitron, European Space Agency, Eaton, Fluid Automation, Gauss Magneti, Goodrich, Hager Electric, Ikerlan, Iskra Stikala, Isliker Magnete, ISL, JCAE, Legrand, Leach international, LG electronics, Luxalp, Magneti Marelli, Magnet Schultz, Mecalectro, Parker Hannifin, PSA, Protonic, Robert Bosch, Schienle, Schneider Electric, Sulzer Innotec, TEC Automatismes, Thales, TRW, Walker Magnetics, Zodiac...