

A Fully Integrated Solution for Actuators Design

You need to design actuators? CEDRAT is there, to offer you a fully integrated solution that brings together building facilities, electromechanical coupling, multi-parametric solving and impressive post processing capabilities.

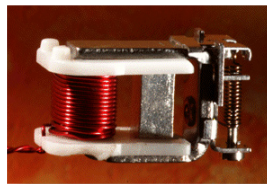
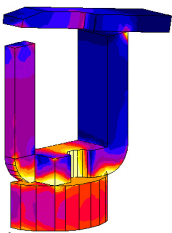
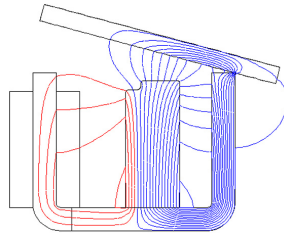
Actuator design and analysis

For a fine design and analysis of any actuator (voice coil, electromagnet, protection relay...), Flux package features many tools to speed up the simulation and get the most accurate results, for both electromagnetic and thermal computations:

» **Geometry building facilities** such as import of CAD files (STEP, IGES, DXF, SAT, CATIAV4, CATIAV5, Pro-E...) or model reduction thanks to symmetries and periodicities

» **Physics definition:** Material database (magnet, steel), non meshed coil in 3D, eddy currents in 2D and 3D

» **Advanced embedded electrical circuit editor** to model the drive of the actuator



Protection relays modelled in 2D and 3D with Flux.

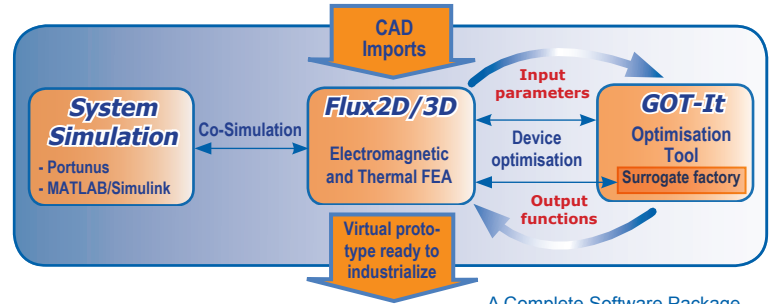
» **Electromechanical coupling** in 2D and 3D to take into account the **linear and rotating motion** of the actuator during the computation (mass, friction, drag force, spring stiffness...) as well as to compute all mechanical quantities (speed, position, force...).

» **Automatic mesh**

» **Material database** (magnet, steel, ...)

The **different simulation methods**

- » multi-position
- » constant speed
- » coupled load



A Complete Software Package for Actuator Design

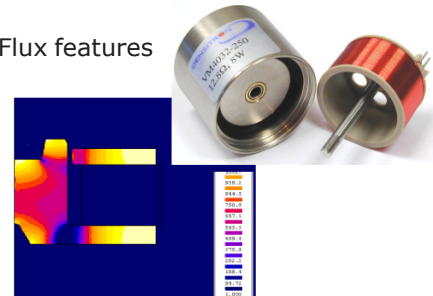
and **analysis**

- » static
- » AC steady state
- » transient

make Flux a powerful tool to study any configuration of your device.

Optimisation

To optimise an actuator, Flux features a **multi-parametric solver** allowing any parameter to be varied (geometric dimensions, mesh, material properties, electrical source, time...) and solving various scenarios in only one run.



Voice coil actuator (courtesy of Densitron).

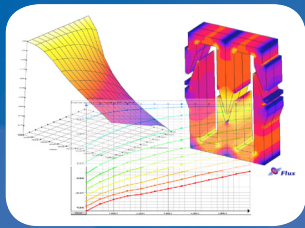
To find the best configuration and reduce the computation time, Flux features the coupling with **GOT-It**, the CEDRAT Advanced Optimisation Tool. This can be very useful for instance to minimise the losses in the actuators, to reduce the response time or to meet a force vs stroke curve.

Postprocessing of the results

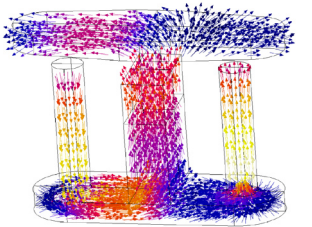
Flux multi-parametric postprocessor gives a direct access to all the results, with various formats: point values, color-shaded maps, isolines, arrows distribution,

Key applications

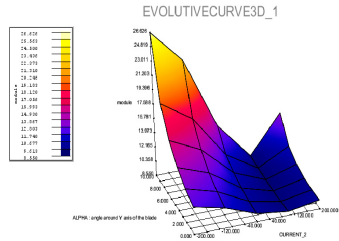
- » Circuit breakers
- » Protection relays
- » Electromagnets
- » Linear Motors
- » Plungers
- » Printer needles
- » Eddy Current brakes
- » Magnetic couplers
- » Mechatronic systems
- » Voice coils



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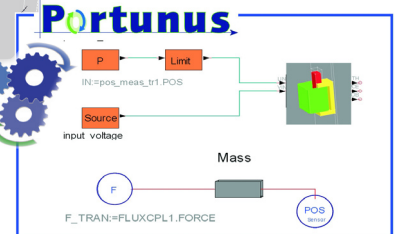
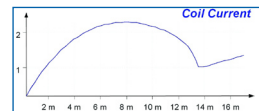
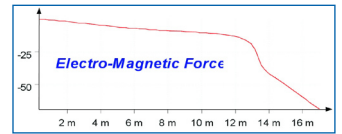
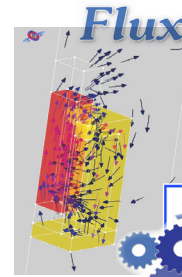


Flux density displayed on half of an electromagnet modelled with Flux.



3D graph of the force in function of the angle and current.

2D/3D curves, animations, export to Excel, automatic report, print picture in file...



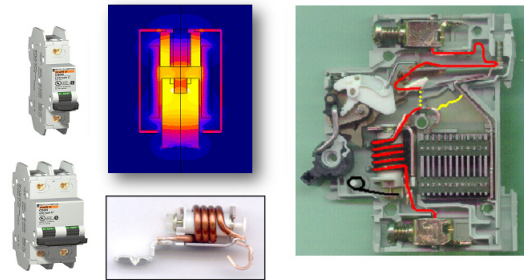
Coupling of a moving core actuator modelled in Flux with its mechatronic environment described in Portunus.

The actuator and its drive

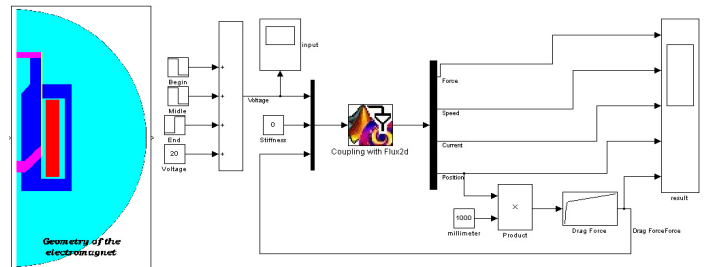
The transient behaviour of an actuator is widely dependent on its drive. Then modelling both the actuator and its drive gives a better prediction of the behaviour.

Thanks to the advanced **Flux to Portunus co-simulation technology** it is now possible to model any complex drive. The co-simulation allows integrating the actuator in its mechatronic environment and improving its drive.

It also enables to account for saturation and eddy currents (thanks to Flux) as well as motion and control loops within the same simulation run. The results can then be analysed with Portunus or with the fully equipped Flux multiparametric postprocessor. Flux to Simulink co-simulation technology is also available.



Circuit breaker optimised with Flux (courtesy of Schneider Electric).



Drive and control of an electromagnet with the Flux to Simulink Technology.

References

For any type of actuator, CEDRAT solutions are the reference in many organisations worldwide:

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...

More technical information:
www.cedrat.com/en/software-solutions/applications/

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