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Scilab & SimulationX – Electric Motor Optimization

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Abstract

With today's trend for electric car, every car maker must go back to specifications and preliminary design to replace basic powertrain functions. In order to make this electric car-paradigm a reality, suppliers have therefore to provide car manufacturers with optimal design taking into account new design tradeoffs such as autonomy and power to be delivered.

In this context, ESI has been working with both manufacturers and suppliers of the automotive domain on optimizing the design of electric motors (and associated batteries). Considering that such design requires many geometric changes (number of poles rotor/stator, number of coil's turns, number of phases, ...), Finite Element Analysis (FEA) prove to be too expensive in terms of computing power for large design space exploration on a dynamic model (each simulation taking several hours).

Following clients' needs, ESI solutions are twofold. First, providing simulation solution for multi-physics static finite element modeling and dynamic system modeling. Second, integrate the solution with Scilab through the Functional Mock-up Interface (FMI) and giving access to the results via a tailored application.

Model reduction and optimization techniques can then be leveraged in order to consider the changes in the geometry and the design parameters. Future developments will be about interfacing additional external tools & libraries with Scilab (like Octave for Matlab compatibility) to serve as an integration hub and deployment platform for both academics & industries.

