

Workshop: Optimization of Electric Drives

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Optimization and
Stochastic Days 2020 June 25 – 26, 2020
Virtual Conference

Optimization of Electric Drives – Workshop Agenda

Electric machine design challenges in automotive (S. DiFraia)

AEDT & Motor-CAD integration technology (M. Stokmaier)

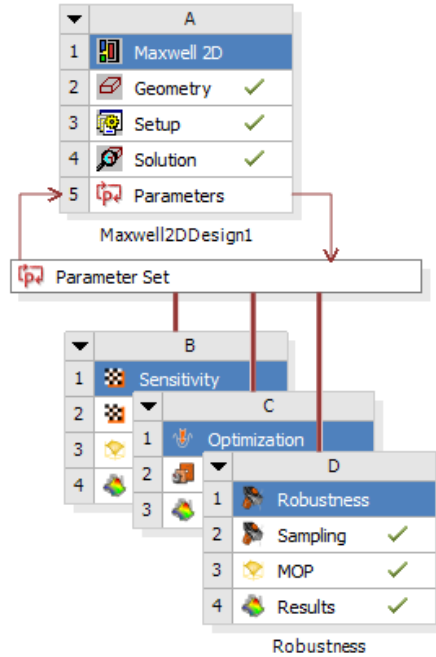
- Plugin-based solver integration for AEDT & Motor-CAD
- Python-based solver integration

Optimization of electric drives (M. Michon, M. Stokmaier)

- A challenging P2HEV traction motor application
- Evaluation routine for design variations
- MOP-based multi-objective optimization

Discussions

optiSLang integrations for Motor-CAD and AEDT



AEDT



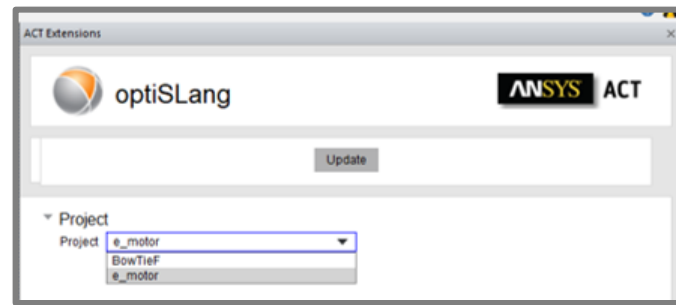
MotorCAD_solve



AEDT_advanced (Beta)



Python



Simulation in Electromagnetics and Beyond

Physics

- electro-statics & low frequency
- high frequency & waves
- circuits & signals

Methods

- analytics & numerics
- reduced models & fully resolved fields
i.a. lumped, FEM, BEM, ray tracing, ...

Focus on today's challenges

- electric motors → type → setup → drive U,I → optimal design
- simulation workflow & design variation
→ leverage algorithmic power
→ make best design decisions consciously on a sound basis

Best Practice

different for every discipline

different for every application

different for every team

programmed workflow
= **codified best practice**

Simulation in Electromagnetics and Beyond

Developments

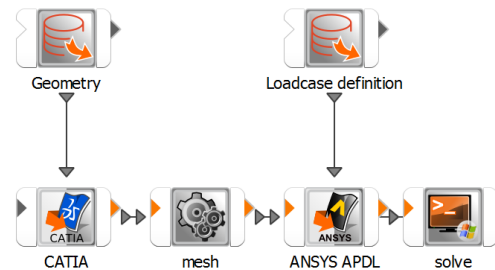
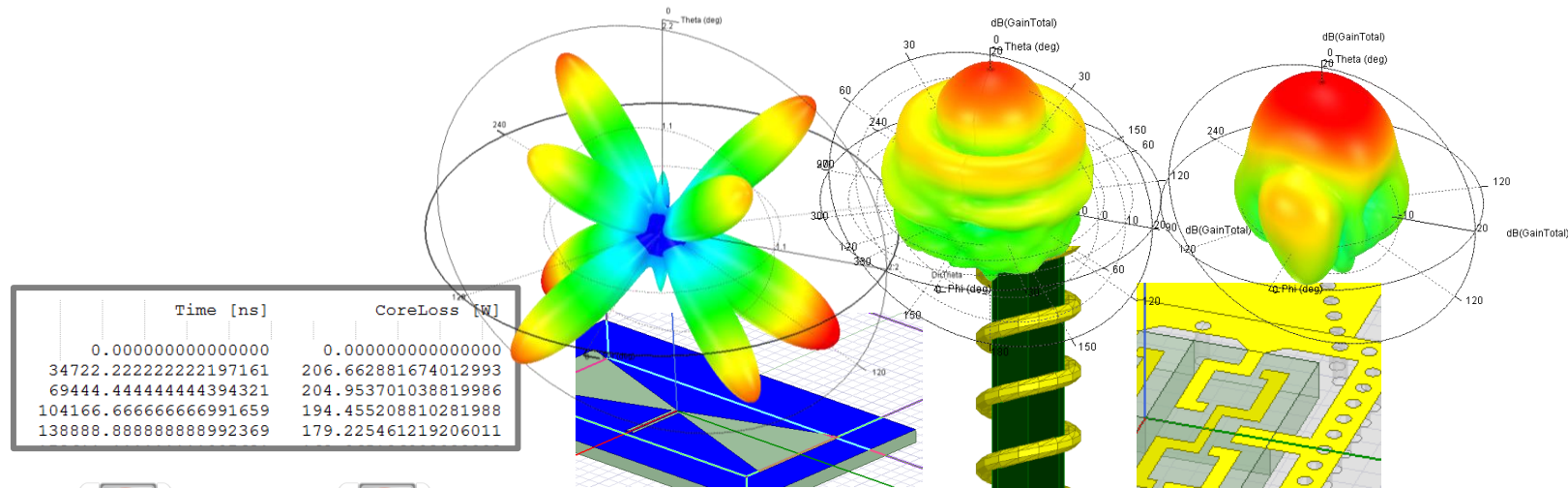
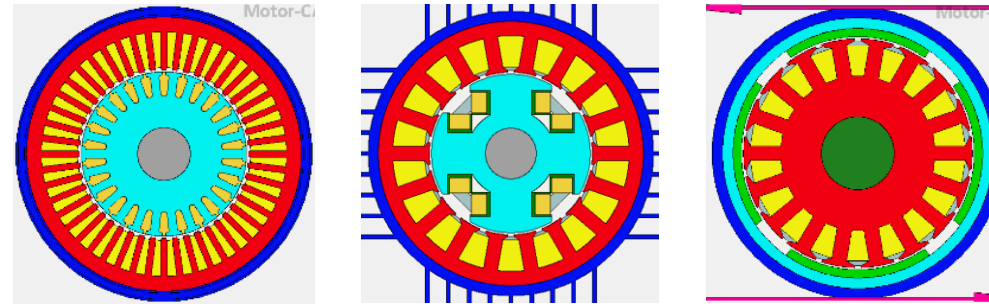
- Electrification, IoT, 5G,...
- virtual development
- connected automated control

Challenges

- design space: topology & parametric
- goal conflicts due to multi-physics
- goal conflicts at system level

Needs

- manoeuvrability in design spaces
→ human & algorithmic decisions
- workflow automation
- communicating component data
→ specs, CAD, maps, tolerances/scatter

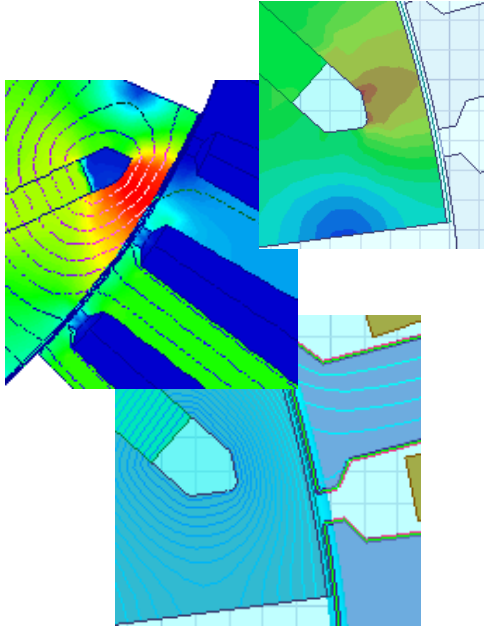


The team with the quickest workflow work-through speed ...
... can base decisions on objective comparisons
... can place the best innovate solutions



Getting value from simulation

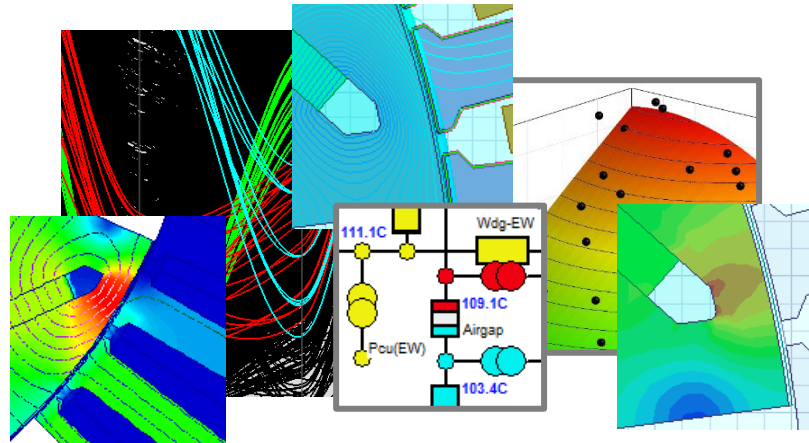
Geek Extremism



I know exactly where the torque ripples are coming from.
What should we do against them?
Well, good question, there are plenty of ideas ...

The ideal team masters:
**Balance & Practicality & Speed
& Long-Lasting Effect**

- know when to seek causality in details
- know when to seek system understanding
- know when to go algorithmic
- roll out successful best practice & workflows

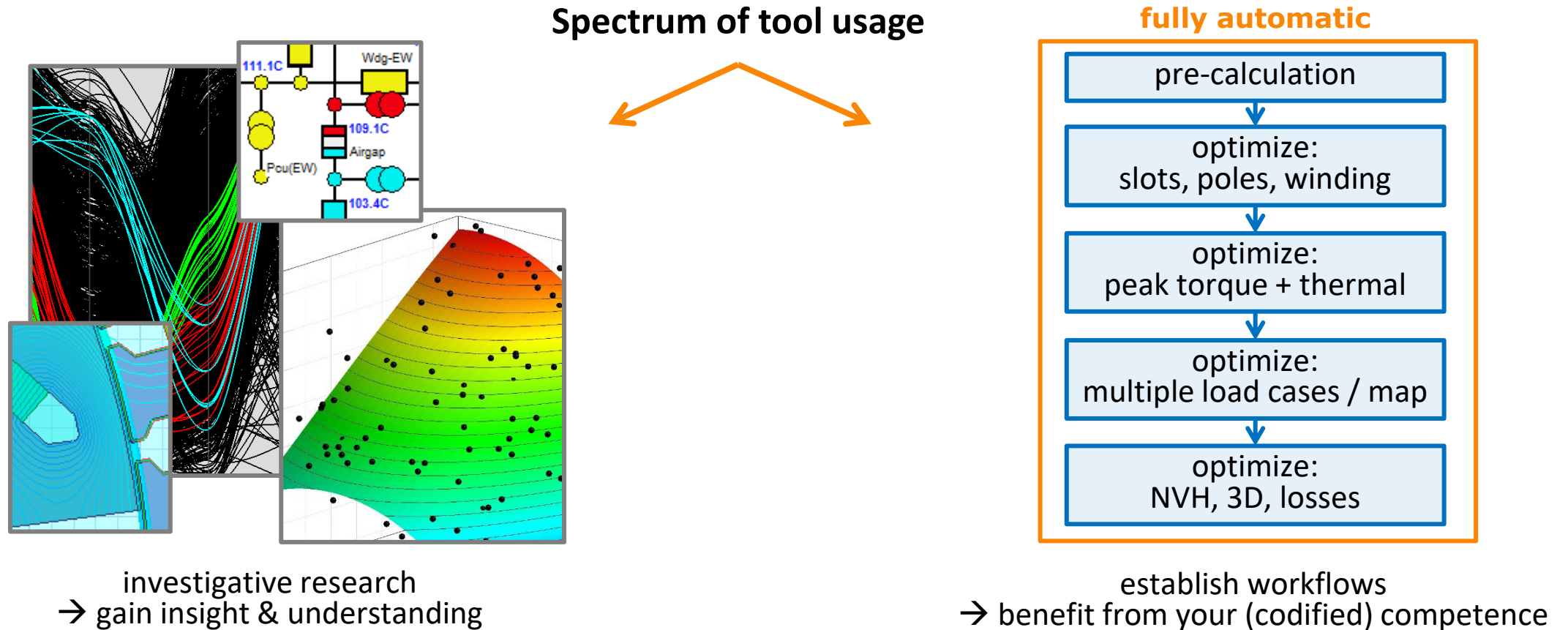


Tool Extremism



lazy application of black-box algorithms to black-box problems

Getting value from simulation



**Combining Motor-CAD & Electronics Desktop & optiSLang
you have the entire spectrum at your fingertip every day**



**Thanks for your interest,
attention & discussion
Enjoy WOSD!**

