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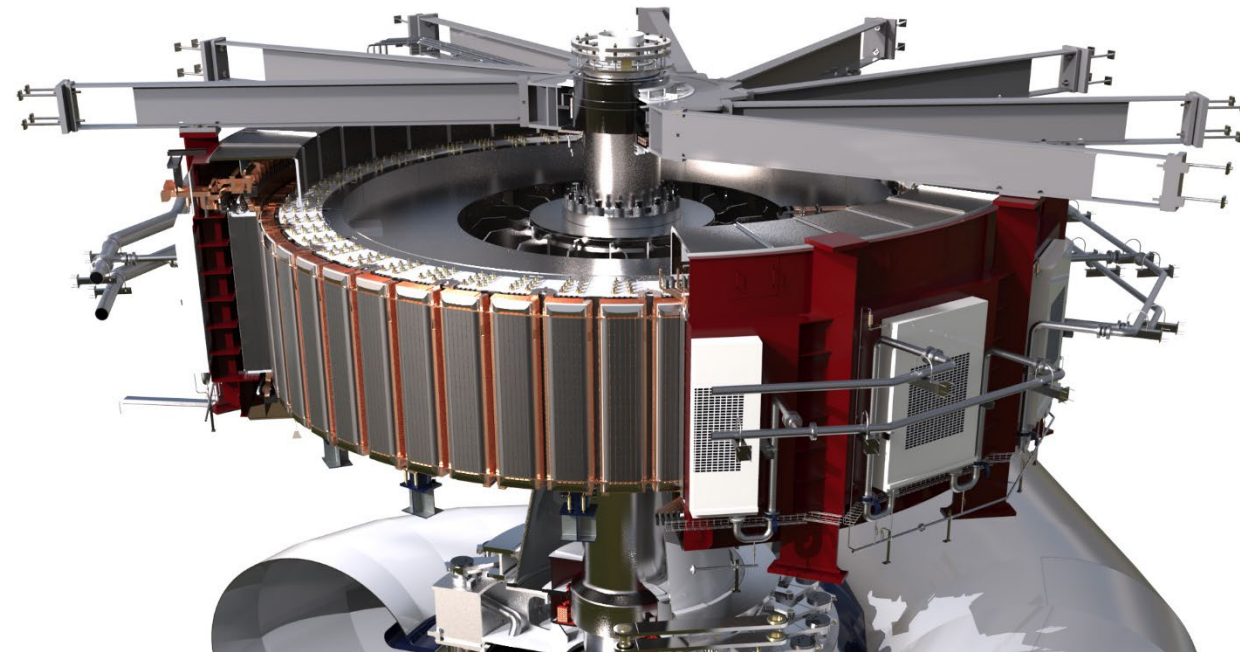
Where is electrotechnical research in hydropower heading?

Urban Lundin, Uppsala University



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I present the hydropower generator – a most mechanical electrical product





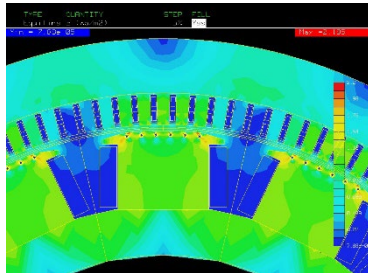
International research – hydropower, electrical

- Less on generators, more on systems and use of
 - Standard on HP generators
- Less experiments, more simulations
- Role of research?
 - Competence provider, people and knowledge
 - NOT a Consultant/supplier
 - Challenge old ideas & work on new ones



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History in Uppsala



Traditional
electrical
machines,
components

Better
models,
Interaction
with
mechanics,
power
system,..

Use of
systems
developed.
Pilot
testing.





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Present projects (see posters)

- Wanted and unwanted forces inside generators & generators without damper bars
- Hybrid power plants
- Dump-loads - Electrical spillways enabling new modes of operation



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Future challenges, or not?

There will be a need for:

- Transmission
- Generation
- Energy
- Grid services
- Storage





What does the future hold for the electrotechnical parts of Hydropower?

Challenges

- To build today for needs of 2070
- Base-load → System services
- Water planning for very variable system needs
- Increase flexible operation

Possibilities

- Digitalization/communication/control systems
 - Virtual power plants aggregation
- Embrace power electronics
- Hybridization



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Thank you for your attention!



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