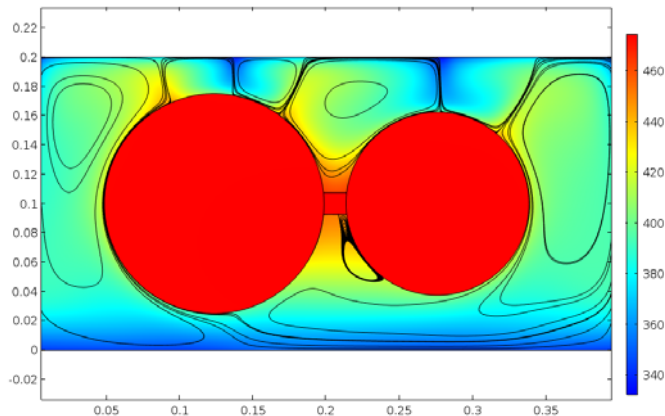
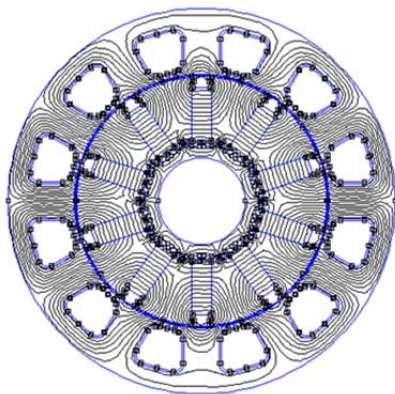


R3ASC 2016: Tutorial on preliminary design of actuation systems

The preliminary design of actuation systems requires suitable models: simple algebraic equations that can be easily implemented in worksheets, system level modelling or optimization loops. This tutorial focuses on components models suitable at system design level where useful characteristics of the components should be estimated with a limited number of input variables but which may vary on wide ranges. The agenda of this tutorial is:

- Estimation models, dimensional analysis and scaling laws
- Introduction to response surface methodology, meta-models and surrogate models
- Extraction of compact forms of design models from finite element simulations
- Examples of brushless motors (magnetism) and housing (heat transfer)
- Preliminary design of an EMA actuator



Animation of the tutorial : Dr Marc Budinger, Dr Ion Hazyuk, Florian Sanchez



Marc Budinger, alumni of the ENS Cachan (Paris), has received the Agregation degree in Applied Physics in 1998, the Ph.D degrees in Electrical Engineering from Institut National Polytechnique de Toulouse in 2003. He is now associate professor with the Mechanical Engineering Department of INSA Toulouse. His research activities have included design of electrical submarine propulsion motor, piezoelectric actuators, MEMS. His current research topic deals with modeling and simulation for the preliminary design of aerospace electromechanical actuators.



Ion Hazyuk received the Ph.D degree in Control Engineering from the National Institute of Applied Science of Lyon, France, in 2011. He is now associate professor with the Mechanical Engineering Department of INSA Toulouse. His actual research focuses on modeling, simulation and control of electromechanical actuators in the preliminary design stages.



Florian Sanchez received the Master of Science degree in Modelling and Simulation on Mechanics and Energetics from Paul Sabatier University in Toulouse, in 2012. He is now PhD Student at Institut Clément Ader and his actual research focuses on model reduction and thermal modelling of embedded actuators and electrical systems.