Electromagnetic Analysis with Abaqus

Abaqus 2019
Course objectives
Upon completion of this course you will be able to:

- Set up and create electromagnetic models with Abaqus
- Perform low frequency eddy current analyses with Abaqus
- Perform transient eddy current analyses with Abaqus
- Perform magnetostatic analyses with Abaqus

Targeted audience
Simulation Analysts

Prerequisites
This course is recommended for engineers with experience using Abaqus
Day 1

- Lecture 1  Introduction to Computational Electromagnetics
- Lecture 2  Geometry, Material Properties, Elements and Meshing
  - Workshop 1  Heating of a Rod: Problem setup
  - Workshop 2  Sphere in a Magnetic Field: Problem setup
- Lecture 3  Loads and Boundary Conditions
- Lecture 4  Output and Transfer of Results
  - Workshop 1 (cont’d)  Heating of a Rod: Thermal Response
  - Workshop 2 (cont’d)  Sphere in a Magnetic Field: Electromagnetic Response
- Workshop 3  Magnetostatic Analysis of a Solenoid Valve
- Workshop 4  Magnetic Pulse Forming of a Metallic Tube
SIMULIA is the Dassault Systèmes brand for Realistic Simulation solutions

Portfolio of established, best-in-class products

- Abaqus, Isight, Tosca, fe-safe, Simpack

* Included in extended licensing pool
SIMULIA’s Power of the Portfolio

**Abaqus**
- Routine and Advanced Simulation
- Linear and Nonlinear, Static and Dynamic
- Thermal, Electrical, Acoustics
- Extended Physics through Co-simulation
- Model Preparation and Visualization

**Isight**
- Process Integration
- Design Optimization
- Parametric Optimization
- Six Sigma and Design of Experiments

**Tosca**
- Non-Parametric Optimization
- Structural and Fluid Flow Optimization
- Topology, Sizing, Shape, Bead Optimization

**fe-safe**
- Durability Simulation
- Low Cycle and High Cycle Fatigue
- Weld, High Temperature, Non-metallics

**Simpack**
- 3D Multibody Dynamics Simulation
- Mechanical or Mechatronic Systems
- Detailed Transient Simulation (Offline and Realtime)

**Realistic Human Simulation**
- High Speed Crash & Impact Noise & Vibration

**Material Calibration**
- Workflow Automation
- Design Exploration

**Conceptual/Detailed Design**
- Weight, Stiffness, Stress Pressure Loss Reduction

**Safety Factors**
- Creep-Fatigue Interaction
- Weld Fatigue

**Complete System Analyses**
- (Quasi-)Static, Dynamics, NVH Flex Bodies, Advanced Contact
Join the Community!

How can you maximize the robust technology of the SIMULIA Portfolio?
Connect with peers to share knowledge and get technical insights

Go to www.3ds.com/slc to log in or join!

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## Revision Status

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Lesson 1: Introduction to Computational Electromagnetics

*Lesson content:*

- Motivation
- Basics of Electromagnetism
- Computational Electromagnetics in Abaqus
- Workflow of an Electromagnetic Analysis
- Examples

45 minutes
Lesson 2: Geometry, Material Properties, Elements and Meshing

Lesson content:

- Geometry Creation
- Material Properties
- Element Technology
- Meshing
- Workshop Preliminaries
- Workshop 1: Heating of a Rod: Problem setup
- Workshop 2: Sphere in a Magnetic Field: Problem setup

2 hours
Lesson 3: Loads and Boundary Conditions

Lesson content:

- Introduction
- Loads
- Boundary Conditions
- Symmetry
- Motion
Lesson 4: Output and Transfer of Results

Lesson content:

- Analysis Procedures
- Co-simulation
- Sequential Mapping
- Output
- Workshop 1 (cont’d): Heating of a Rod: Thermal Response
- Workshop 2 (cont’d): Sphere in a Magnetic Field: Electromagnetic Response
- Workshop 3: Magnetostatic Analysis of a Solenoid Valve
- Workshop 4: Magnetic Pulse Forming of a Metallic Tube

3 hours