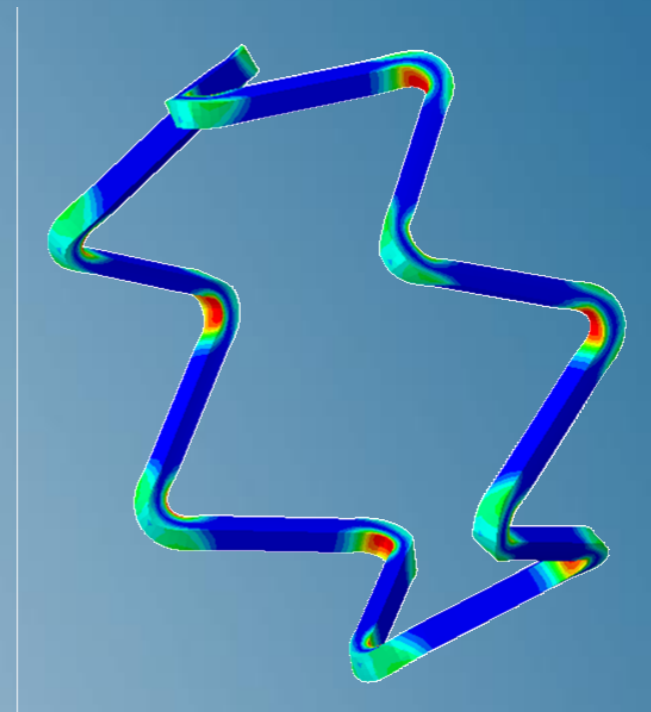


Modeling Stents Using Abaqus

Abaqus 2021



3DEXPERIENCE[®]



About this Course

Course objectives

Upon completion of this course you will be able to:

- ▶ Create geometry for modeling stents and tools
- ▶ Choose the proper element type
- ▶ Choose material models: elastic-plastic (Stainless Steel), superelastic-plastic (Nitinol), hyperelastic (vessels)
- ▶ Perform stent analyses: Static, Implicit and Explicit Dynamics
- ▶ Define contact and constraints
- ▶ Postprocess stent analyses
- ▶ Perform fatigue evaluation

Targeted audience

Simulation Analysts

Prerequisites

This course is recommended for engineers with experience using Abaqus



2 days

Day 1

- ▶ Lesson 1 Introduction
- ▶ Lesson 2 Geometry and Meshing
- ▶ Lesson 3 Element Selection and Mesh Convergence
 - Workshop 1a Balloon-expanded Stent – Geometry and Meshing
 - Workshop 1b Self-expanding Stent – Geometry and Meshing
- ▶ Lesson 4 Material and Section Properties
 - Workshop 2a Balloon-expanded Stent – Materials and Sections
 - Workshop 2b Self-expanding Stent – Materials and Sections

Day 2

- ▶ Lesson 5 Analysis Procedures

- ▶ Lesson 6 Loads, Contact and Constraints
 - Workshop 3a Balloon-expanded Stent – Analysis Setup

 - Workshop 3b Self-expanding Stent – Analysis Setup

- ▶ Lesson 7 Postprocessing Stent Analyses
 - Workshop 4a Balloon-expanded Stent – Postprocessing

 - Workshop 4b Self-expanding Stent – Postprocessing

 - Workshop 5 Nitinol Fatigue: Stent Fatigue Example

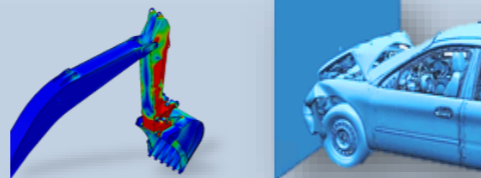
Additional Material

- ▶ Appendix 1 Nitinol Fatigue
- ▶ Workshop 6 Nitinol Fatigue: Stent Fatigue fe-safe

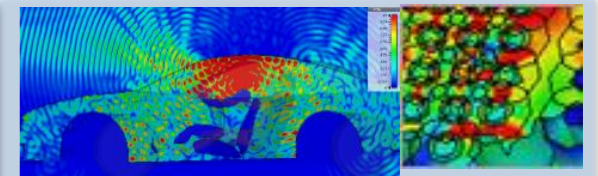
SIMULIA

- ▶ SIMULIA is the Dassault Systèmes brand for realistic simulation solutions.
- ▶ Advanced simulation portfolio covering simulation disciplines such as structural mechanics, computational fluid dynamics and electromagnetic field simulation, for a true multiphysics simulation approach.

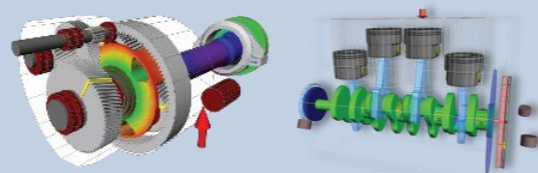
Structures



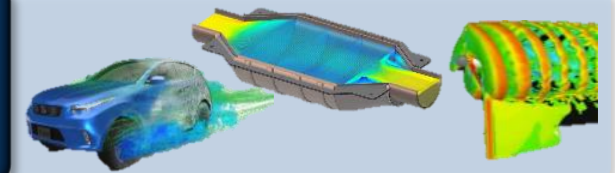
Electromagnetics



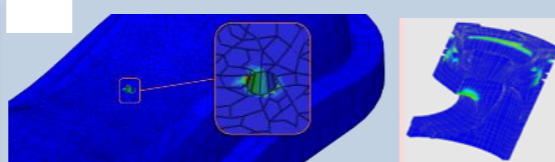
Multibody



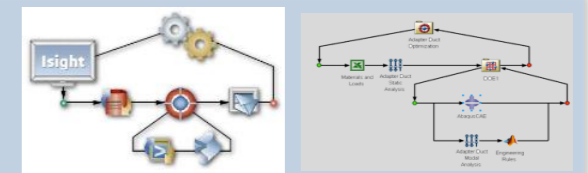
Fluids



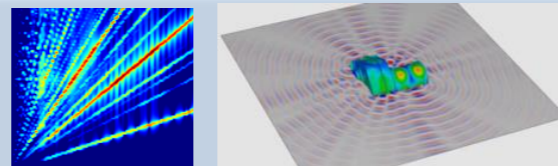
Durability



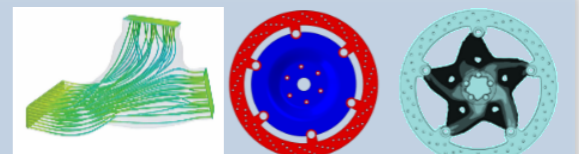
Automation



Vibro-acoustics



Optimization



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Revision Status

Lesson 1	11/20	Updated for Abaqus 2021
Lesson 2	11/20	Updated for Abaqus 2021
Lesson 3	11/20	Updated for Abaqus 2021
Lesson 4	11/20	Updated for Abaqus 2021
Lesson 5	11/20	Updated for Abaqus 2021
Lesson 6	11/20	Updated for Abaqus 2021
Lesson 7	11/20	Updated for Abaqus 2021
Appendix 1	11/20	Updated for Abaqus 2021
Workshop 1a	11/20	Updated for Abaqus 2021
Workshop 1b	11/20	Updated for Abaqus 2021
Workshop 2a	11/20	Updated for Abaqus 2021
Workshop 2b	11/20	Updated for Abaqus 2021
Workshop 3a	11/20	Updated for Abaqus 2021
Workshop 3b	11/20	Updated for Abaqus 2021
Workshop 4a	11/20	Updated for Abaqus 2021
Workshop 4b	11/20	Updated for Abaqus 2021
Workshop 5	11/20	Updated for Abaqus 2021
Workshop 6	11/20	Updated for Abaqus 2021

Lesson 1: Introduction

Lesson content:

- ▶ Stent Basics
- ▶ Stent Modeling
- ▶ Modeling Stents using Abaqus



30 minutes

Lesson 2: Geometry and Meshing

Lesson content:

- ▶ Introduction
- ▶ Creating Stents
 - Example: Create Laser Cut Stents
 - Example: Create Braided Wire Stents
- ▶ Creating Expansion and Crimping Tools
- ▶ Stent Residing Vessels
 - Import STL file
- ▶ Import Orphan Meshes
- ▶ Unwrap a Deformed Stent into Flat Geometry



45 minutes

