

FSI Simulation with Abaqus and Third-party CFD Codes

Abaqus 2018







About this Course

Course objectives

Upon completion of this course you will be able to:

- Evaluate FSI applications
- Create compatible CSM and CFD models for FSI
- Run FSI problems
- Understand co-simulation strategies

Targeted audience

This seminar is recommended for both structural and CFD engineers with an interest in evaluating and analyzing real world FSI applications.

Prerequisites

None



- Lecture 1 Introduction
- Lecture 2 Technical Details
- Lecture 3 Conducting an FSI Simulation using Abaqus and STAR-CCM+
 - Workshop 1 Antilock Braking System (Abaqus + STAR-CCM+)
- Lecture 4 Classifying FSI Applications
 - Workshop 2 Stead-State Flow in an Exhaust Manifold (Abaqus + STAR-CCM+)
- Lecture 5 Miscellaneous Topics

Appendix 1 An Overview of CFD for Structural Analysts

SIMULIA

- SIMULIA is the Dassault Systèmes brand for Realistic Simulation solutions
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 - Abaqus, Isight, Tosca, fe-safe, Simpack



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Training Schedule & Registration

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> By Location

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Live Online Training



> Full Schedule

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Lecture 1	11/17	Updated for Abaqus 2018
Lecture 2	11/17	Updated for Abaqus 2018
Lecture 3	11/17	Updated for Abaqus 2018
Lecture 4	11/17	Updated for Abaqus 2018
Lecture 5	11/17	Updated for Abaqus 2018
Appendix 1	11/17	Updated for Abaqus 2018
Workshop 1	11/17	Updated for Abaqus 2018
Workshop 2	11/17	Updated for Abaqus 2018

Lesson 1: Introduction

- Multiphysics / Multiscale Simulation
- SIMULIA Multiphysics
- What is Co-Simulation?
- Co-Simulation Applications
- SIMULIA Co-Simulation
- CFD Co-Simulation with Abaqus
- Fluid-Structure Interaction
- FSI Applications
- FSI Examples
- Conjugate Heat Transfer between Solid and Fluids
- CHT Applications
- CHT Example
- FSI/CHT Co-Simulation Attributes



Lesson 2: Technical Details

- What is Co-Simulation?
- Monolithic vs Segregated Solution
- Overcoming Numerical Challenges
- Definitions
- Technical Approach
- Determining the Coupling Step Size
- Common Coupling Strategies
- Updating the CFD Domain
- Software Architecture



Lesson 3: Conducting an FSI Simulation using Abaqus

- Suggested Generic Workflow
- ► FSI Workflow using STAR-CCM+
- Workshop Preliminaries
- Workshop 1: Antilock Braking System (Abaqus + STAR-CCM+)



Lesson 4: Classifying FSI Applications

- Unidirectional Coupled Analysis
- Bidirectional Coupled Analysis
- File-Based Sequential Coupling
- Estimating Coupling Strength
- Workshop 2: Stead-State Flow in an Exhaust Manifold (Abaqus + STAR-CCM+)



Lesson 5: Miscellaneous Topics

- Co-Simulation Director
- The *CO-SIMULATION option
- Restart Analysis
- Convergence
- Workflow between CSS and Solvers
- Manually Starting the CSS Director Process



Appendix 1: An Overview of CFD for Structural Analysts

Appendix content:

- Introduction
- Governing Equations for Fluid Dynamics
- Computational Fluid Dynamics
- Fluid Properties
- CFD Modeling

