

FSI Simulation with Abaqus and Third-party CFD Codes

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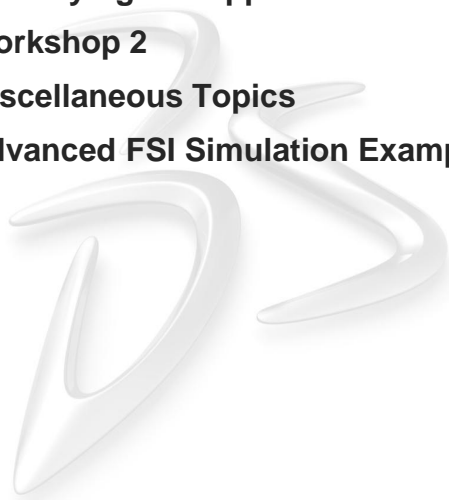


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Agenda

- Introduction
- Technical Details
- Conducting an FSI Simulation using Abaqus and STAR-CCM+
- Workshop 1
- Classifying FSI Applications
- Workshop 2
- Miscellaneous Topics
- Advanced FSI Simulation Examples

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Appendices

- An Overview of CFD for Structural Analysts
- Coupling Schemes and Rendezvousing
- Conducting an FSI Simulation using the MpCCI GUI and FLUENT



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Revision Status

Lecture 1	5/11	Updated for 6.11
Lecture 2	5/11	Updated for 6.11
Lecture 3	5/11	Updated for 6.11
Lecture 4	5/11	Updated for 6.11
Lecture 5	5/11	Updated for 6.11
Lecture 6	5/11	Updated for 6.11
Appendix 1	5/11	Updated for 6.11
Appendix 2	5/11	Updated for 6.11
Appendix 3	5/11	Updated for 6.11
Workshop 1a	5/11	Updated for 6.11
Workshop 1b	5/11	Updated for 6.11
Workshop 2a	5/11	Updated for 6.11
Workshop 2b	5/11	Updated for 6.11



Introduction

Lecture 1

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L1.2

Overview

- SIMULIA Multiphysics
- Fluid-Structure Interaction
- Multiphysics Coupling
- Target Applications
- Software Suite
- Examples

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Technical Details

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L2.2

Overview

- **Technical Approach**
- **Software Architecture**
 - Independent Code Coupling Interface through MpCCI
 - SIMULIA Co-simulation Engine
- **Code Coupling Process**

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Conducting an FSI Simulation using Abaqus

Lecture 3

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L3.2

Overview

- Suggested Workflow
- FSI Workflow using STAR-CCM+
- Step-by-Step Example

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Classifying FSI Applications

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L4.2

Overview

- Classification of FSI problems
- Unidirectional Coupled Analysis
- Bidirectional Coupled Analysis

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Miscellaneous Topics

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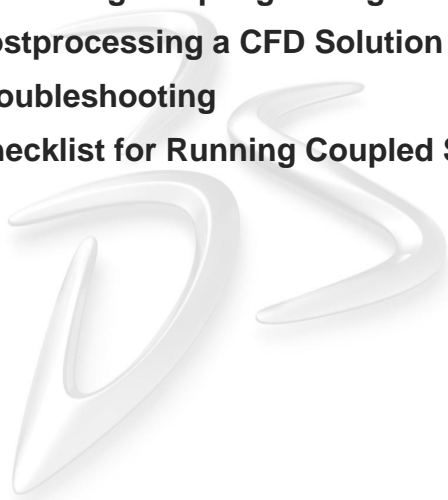


L5.2

Overview

- The Abaqus *CO-SIMULATION option
- Axisymmetric Analysis
- Restart Analysis
- Convergence
- Estimating Coupling Strength
- Postprocessing a CFD Solution with Abaqus/CAE
- Troubleshooting
- Checklist for Running Coupled Simulation

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Advanced FSI Simulation Examples

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L6.2

Overview

- Vernay-VernaFlo® Fluid Flow Valve
- DG-1000 Glider
- Engine Head with Coolant Flow

*Courtesy of Vernay
Laboratories*



Courtesy of ETH Zürich



Courtesy of Deutz, AG

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An Overview of CFD for Structural Analysts

Appendix 1

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A1.2

Overview

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

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Coupling Schemes and Rendezvousing

Appendix 2

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A2.2

Overview

- **Definitions**
- **Implicit and Explicit Time Integration**
- **Coupling Schemes**
- **Rendezvousing**

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Conducting an FSI Simulation using the MpCCI GUI and FLUENT

Appendix 3

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A3.2

Overview

- Suggested Workflow
- Step-by-Step Example
- Summary of MpCCI Settings for FLUENT
- Preparing a FLUENT Job for Co-Simulation

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