Day 1

- Lecture 1: Introduction
- Lecture 2: User Subroutines *(V)*DLOAD and UTRACLOAD
- Lecture 3: User Subroutine FILM
- Workshop 1: User Subroutine FILM
- Lecture 4: User Subroutine *(V)*USDFLD
- Lecture 5: User Subroutine URDFIL
Day 2

- Lecture 6: User Subroutine UVARM
- Lecture 7: Writing a UMAT or VUMAT
- Workshop 2: User Subroutine UMAT: Tangent Stiffness
- Lecture 8: Creating a Nonlinear User Element (UEL and VUEL)

Appendices

- Appendix 1: Logical Modeling in Abaqus
- Workshop 3: Controlling an Inverted Pendulum with VUAMP
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Revision Status

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Overview

- Overview of Some User Subroutines
- Where User Subroutines Fit into Abaqus/Standard
- Including User Subroutines in a Model
- Writing Output from User Subroutines
- Compiling and Linking User Subroutines
- Debugging Techniques and Proper Programming Habits
- Support for User Subroutines
Overview

- Introduction
- Abaqus Usage
- DLOAD Subroutine Interface
- Example: Viscoelastic Cylinder
- Example: Asymmetric Pressure Loads
- VDLOAD Subroutine Interface
- Example: Viscoelastic Cylinder Revisited
- UTRACLOAD Subroutine Interface
- Example: Flexure of a Cantilever Beam
Overview

- Introduction
- Abaqus Usage
- FILM Subroutine Interface
- Example: Radiation in Finned Surface
- Workshop: User Subroutine FILM
Overview

- Introduction
- Abaqus Usage
- Utility Routine GETVRM
- USDFLD Subroutine Interface
- Example: Laminated Composite Plate Failure
- Utility Routine VGETVRM
- VUSDFLD Subroutine Interface
- Example: Laminated Composite Plate Failure Revisited
Overview

- Introduction
- Abaqus Usage
- URDFIL Subroutine Interface
- Example: Using URDFIL to Terminate an Analysis
Overview

- Introduction
- Abaqus Usage
- UVARM Subroutine Interface
- Example: Calculation of Stress Relative to Shift Tensor
- Creating Contour Plots for UELs
Writing a UMAT or VUMAT

Lecture 7

Agenda

• Overview
• Motivation
• Steps Required in Writing a UMAT or VUMAT
• UMAT Interface
• Example 1: UMAT for Isotropic Isothermal Elasticity
• Example 2: UMAT for Non-Isothermal Elasticity
• Example 3: UMAT for Neo-Hookean Hyperelasticity
• Example 4: UMAT for Kinematic Hardening Plasticity
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• VUMAT Interface
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• Example 7: VUMAT for Neo-Hookean Hyperelasticity
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• Example 9: VUMAT for Isotropic Hardening Plasticity
Overview

- Motivation
- Defining a User Element in Abaqus/Standard
- UEL Interface
- Example 1: Planar Beam Element with Nonlinear Section Behavior
- Example 2: Force Control Element
- Example 3: Plane Strain Element
- UELMAT Interface
- Using Nonlinear User Elements in Various Analysis Procedures
- Defining a User Element in Abaqus/Explicit
- VUEL Interface
- Example 4: Three-Dimensional Truss Element
Overview

• Introduction
• Defining Logical Modeling
• Example: Force Control
• Workshop