Introduction To Langrangian Analysis Using Dytran

MSC.Dytran is designed to solve transient dynamic problems involving a high degree of nonlinearity. This seminar provides an introduction to the Lagrangian capabilities of MSC.Dytran. The primary emphasis is on how to use the program to solve engineering problems. The major capabilities of the program are covered in detail. The process of performing an analysis is discussed in its entirety, from initial modeling to the postprocessing of results. Hands-on workshops and example problems reinforce the material covered in the lectures. Advice is offered on modeling techniques, meshing, and evaluation of results. In addition, techniques to minimize the cost of analyses are discussed. By the end of the seminar, attendees should be able to apply MSC.Dytran to the solution of practical engineering problems in structural mechanics.

Prerequisites

- Experience with a general-purpose finite element analysis application is recommended

Topics

Day One

- Introduction
  - Overview of MSC.Dytran capabilities
  - Differences between Lagrangian and Eulerian technology
  - Overview of contact and Euler/Lagrange coupling techniques
  - Typical applications
- Explicit transient dynamic analysis
  - Introduction to explicit solution techniques
  - Explicit versus implicit technology
  - When to use explicit technology
- Input definition
  - Overview of the input file
  - Input file formats and data generation
  - File management system
  - Executive control
  - Case control
  - Bulk data
- Running the analysis
  - Modeling
  - Description of the MSC.Dytran files
  - Example input file
  - Restarts and rezones
  - Executing MSC.Dytran
  - Postprocessing using the XDEXTR translator
- Workshop on using XDEXTR

- Basic concepts of Lagrange
  - Theory
  - Computational cycle
  - User subroutine implementation

Day Two

- Lagrangian capabilities
  - Element library
  - Material models
  - Loads and constraints
  - User subroutines
- Workshop example on Lagrange
- Pre-stressing with MSC.Nastran
- Concept of surfaces in MSC.Dytran
  - Surface definition
  - Defining segments
  - Surface modeling
- Lagrangian Interaction Capabilities
  - Contact
  - Tied connections
  - Kinematic connections
  - Breakable connections
- Modeling techniques
  - Mesh design
  - Problem simplification
  - Postprocessing
  - Results interpretation
- Workshop example on Lagrangian interaction

Introduction To Eulerian And Coupled Analysis Using Dytran

MSC.Dytran is a coupled Euler-Lagrange code designed to solve fluid-structure interaction problems. This seminar complements the DYT101 seminar, provides an introduction to the Eulerian processor, and shows how it can be coupled to the Lagrangian, or structural parts, of the model. The emphasis of this seminar is on using the programs to solve engineering problems. The capabilities of the program, including typical applications, are covered in detail. Hands-on workshops and example problems reinforce the lecture material. Advice is offered on modeling techniques, choice of material models, and evaluation of results. In addition, techniques to reduce the cost of analyses are discussed. By the end of the course, attendees should have a basic understanding of how to solve fluid-structure interaction problems using an Euler-Lagrange approach.

Prerequisites

- DYT101 is recommended

Topics

Day One

- Introduction
  - When to use Eulerian and Euler-Lagrange coupling
  - Typical applications
- Basic concepts of Euler
  - Finite volume method
  - General connectivity
  - Computational cycle
  - User subroutine implementation
- Eulerian capabilities
  - Euler element library
  - Material models
  - Boundary conditions
  - User subroutines
- Workshop example on Euler
- General coupling
  - When to use general coupling
  - Theoretical concept of general coupling
  - Input directives
- Workshop example on general coupling

Day Two

- Basic concepts of arbitrary Lagrange-Euler (ALE)
  - When to use ALE
  - MSC.Dytran ALE implementation
  - Input directives
- Workshop example on ALE
- ALE coupling
  - When to use ALE coupling
  - Advantages of ALE coupling
  - Implementation in the finite volume concept
  - Input directives
- Workshop example on ALE coupling
- Modeling techniques
  - Mesh design
  - Problem initialization
  - Coupling techniques
  - Postprocessing