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LS-DYNA Comprehensive ALE & Structured-ALE Modeling Methods & Applications Seminar

Instructor(s): Ian Do, Ph.D., Hao Chen, Ph.D.

2 Days - \$500 Students \$250 w/student ID

Includes on-site continental breakfasts, lunches, breaks, class dinner

Includes 30-day LS-DYNA demo license to practice

Prerequisite: Knowledge in LS-DYNA and the ALE method

Objective: This application oriented seminar is designed to help users get more proficient at using the more complex features of ALE & Structured-ALE (SALE) solvers, and fluid-structure interaction (FSI) modeling. With enough hand notes on each pseudo model constructed, the attendees should be able to create the actually models themselves. Due to the huge amount of output for the models and long run time, the attendees will not have time to run the models in class. The goal is to be able construct each model conceptually. Result review may be done during the discussion of each model.

Description: The ALE section, will be a review of its fundamental theories. To develop a hands-on application knowledge, we will go through discussing & constructing many complex example models in detail. Among the discussions will be model fine-tuning and procedures for debugging, such as ways to deal with FSI leakage, Boundary and initial conditions, mesh resolution design. A similar approach will also be dedicated for the SALE section.

A wide area of application ranges of possible LS-DYNA ALE-SALE-FSI examples is shown on page 2. Due to limited class time and the interests of the attendees, the instructor will select examples and discuss them in detail. Please indicate the examples that are of interest to you upon registration, so they can be prepared. All input files to models discussed in class will be made available for reviewing at attendees convenience, after the class.

Contents: This is a hands-on seminar. For each example model the instructor will define the physics of the problem. Application Examples are on next page.

1. Then the attendees are expected to conceptually construct a detailed pseudo-input file for the model themselves with the pertinent keywords and their critical parameters (pencil-paper approach).
2. Afterward, we will go over the modeling details together.

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LIST OF POSSIBLE APPLICATIONS EXAMPLES:

Basic Concepts:

- (01) Introduction
 - (02) ALE Multi-Material Group (AMMG) concepts and applications
 - (03) Fluid-Structure Interaction (FSI) concepts
 - (04) Initial and boundary condition set up with ALE element formulation (ELFORM=11)
 - (05) Material failure modeling
 - (06) Information on typical unit systems and references
 - (07) S-ALE concepts and modeling techniques

Possible ALE models to be discussed

- (11) Soda can drop
- (12) Tank sloshing and impact
- (13) Extrusion
- (15) Bird strike fan blade assembly model
- (16) Projectile-target penetration modeling
- (17) Simple flow in flexible tube
- (21) Hydrostatic pressure initialization
- (22) Wave impacting floating "ship" (simple model)
- (23) Cylinder (Rocket booster) impacting water model
- (27) Tanker floating and moving through water

There may be a couple of examples related to modeling of energetic materials that are available and may be discussed depending on the attendees' interest (some security restrictions will apply). Please contact Ian if you are interested in this area of analysis.

Possible S-ALE models to be discussed

- (006) Impacts of Yawed Long Rod Projectile Against Thin-Plate
- (005) Mine Blast Effects on a Structure
- (012) Fuel tank sloshing impact
- (022) Ship-Wave Sloshing Interactions
- (035) Detonation under vehicle armor