Blast & Penetration Using LSDYNA

Prerequisite

This training class is intended for the LS-DYNA analysts possessing a comfortable command of the LS-DYNA keywords and options associated with typical Lagrangian analyses. An introduction to LSDYNA class is a must for people who want to attend this class.

Objective of the course

This is a short course on using LSDYNA to solve protective structures, vehicles (IED and mines), and home land security problems. Some mathematical theory is presented for each technique, especially Eulerian and Mesh-free Methods, to provide the typical user with sufficient knowledge to apply the appropriate analysis technique. Examples are used to illustrate the points made in the lectures and train engineers on using the code.

Who should attend?

This training class will provide analysts with the additional tools and knowledge required to model high energy events. The typical attendee is likely to have a background in defense applications, to include protective structures and vehicles, Homeland Defense topics, and terrorist threat mitigation design techniques using simulation.

1. **Introduction**
   - Introduction to Wave Propagation
   - Numerical Techniques to solve High energy problems
     - Lagrangian
     - Eulerian and ALE
     - SPH & EFG
   - Sample applications
2. **Blast & Penetration**
   a. Blast Wave Simulations Techniques
   b. Blast Mitigation Techniques
   c. Applications:
      i. Vehicles
      ii. Underwater Structures
      iii. Buildings with Windows
3. **Material Behavior Under Sever Loading**
   a. Material Models Library
   b. Strain Rate Effect
   c. What is Available That Works for the Defense Problems
      i. Isotropic
      ii. Composites
      iii. Soil
      iv. Concrete
4. **Failure and Damage Modeling**
   a. Fracture
   b. Damage
   c. Element Erosion
5. **Hybrid-III Dummy Response to Blast**
   a. Dummy models and dummy response to blast
6. **Blast Mitigation Structures (literature review)**
   a. Blast mitigation concepts
   b. Seat designs for blast mitigation
   c. Blast energy absorption seat components
7. **Modeling**
   a. Explosively formed projectiles
   b. Shape charges
   c. Fragmentation modeling
8. **Modeling Techniques**
   a. Mesh design
   b. Problem initialization
   c. Post-processing
9. **Impact Data Reduction and analysis**
   a. Intermittent eigen-value analysis
   b. FFT and Filtering