



Locations:

Livermore Software Technology Corp.

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SPG and Peridynamics Methods for Advanced Material Failure Analyses

Instructors: C. T. Wu (LSTC), or W. Hu (LSTC), or Y. Wu (LSTC)

2 Days - \$400 Students \$200 w/student ID

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

Includes 30-day LS-DYNA demo license to practice

Description: This two-day class covers Smoothed Particle Galerkin (SPG) and Peridynamics methods for physical-based material failure simulations in manufacturing, crash and impact penetration applications. The class will provide the fundamental background theory, the related LS-DYNA keywords, unique numerical features, practical applications, experimental validation, and their latest developments. Benchmarks are presented in the workshop as demonstrations for training purpose.

Course contents

[1] **Destructive manufacturing analysis**

- 1). Application: grinding, riveting, shearing, cutting, flow drill screw, self-pierce riveting, self-tapping screw, drilling, ...
- 2). Focus: workpiece-tool interaction, strain/stress and material failure analyses
- 3). Materials: metal, composite

[2] **Impact and fragmentation analysis**

- 1). Application: low/high speed impact and penetration, windshield fracture, delamination and folding, fragmentation, ...
- 2). Focus: material failure and fragmentation due to dynamic wave propagation and contacts
- 3). Material: metal, concrete, rock and soil, composite, glass type brittle materials

[3] **High-lighted features**

- 1.) Self-contact for particles
- 2.) Multiple part-to-part particle contact
- 3.) Particle immersed technique for fibers, T-bar, and other reinforcements
- 4.) Coupling with thermal, FEM, ALE, ...
- 5.) Strain-based and energy-based failure criteria with minimized numerical tuning
- 6.) 3D crack propagation in solid