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