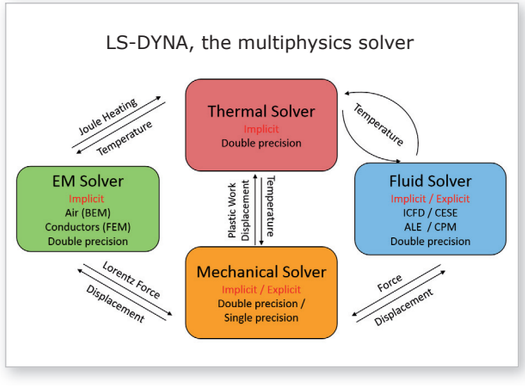
DYNAmore GmbH
Industriestr. 2
D-70565 Stuttgart
Germany

LS-DYNA

LS-DYNA is a highly-advanced general-purpose finite element program that is capable of simulating complex real world problems far beyond the code's origins in nonlinear, transient dynamic finite element analysis using explicit time integration. Thus, it is not only used by the automotive industry but is also highly appreciated in the aerospace, construction, military, manufacturing, and bioengineering industries and research institutes. The shared and distributed memory solver provides very short turnaround times on desktop computers operated using Linux, Windows, and UNIX (32bit oder 64bit) as well as on various cluster and HPC systems.

With LS-DYNA, the Livermore Software Technology Corporation (LSTC) provides a fully loaded tool box with efficient spatial and temporal discretization methods, which enable the seamless solution of coupled problems, even on multiple stages. This includes the class of volume- and surface-coupled problems and refers to the coupling possibilities of the structural solver with the solvers for incompressible and compressible fluids, temperature and electromagnetism.

Moreover, within LS-DYNA, it is possible to join different simulation phases without the necessity to define a tedious and time-consuming transfer to other software packages. Following this, a combination of the features provided by LS-DYNA easily allows for an integrative simulation of different mutually interacting physical phenomena on multiple scales.



DYNAmore GmbH

DYNAmore is dedicated to support engineers in solving nonlinear mechanical as well as multiphysical problems numerically. Our product portfolio includes the finite element solver LS-DYNA, the pre- and postprocessor LS-PrePost and the optimization software LS-OPT as well as numerous finite element models needed for crash worthiness simulation (dummies, barriers, pedestrian and human models, ...). Our main field of activity is to sell, teach, support, and co-develop the software LS-DYNA and LS-OPT. In addition, we provide engineering services for numerical analysis and integrate simulation software in your CAE environment.

Our advanced training offer includes classical seminars, workshops, webinars, support and information days as well as LS-DYNA user conferences. More detailed information can also be found on our support and tutorial websites: www.dynasupport.com and www.dynaexamples.com.

We are one of the first addresses for pilot studies and development projects with respect to the simulation of nonlinear dynamic problems. We are always at your disposal to answer your questions on specific applications as well as test licenses.

You will find DYNAmore in Stuttgart, Dresden, Ingolstadt, Berlin, Langlingen, Zürich (CH), Linköping (S), Göteborg (S), Turin (I) and Versailles (F).

Organization

Venue
DYNAmore Headquarters
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Registration
For your registration please use the registration form, send an email with details to seminar@dynamore.de or use the online registration links which are provided in the seminar description.

FSC
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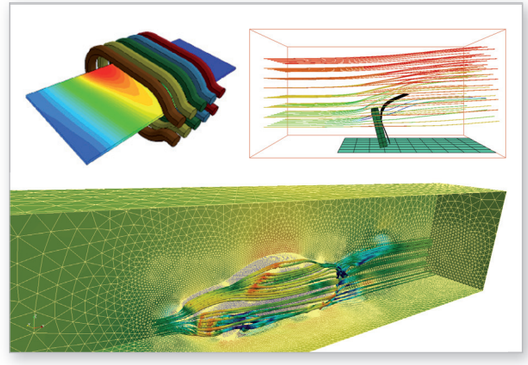
Invitation to the seminar series

Multiphysics with LS-DYNA: EM and CFD with Thermal and Structural Coupling

Stuttgart, Germany

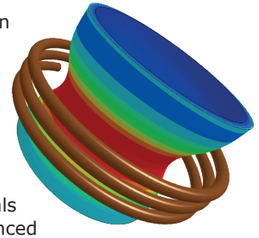


EM – Electromagnetism	5 April
ICFD – Incompressible Fluid Solver	6 - 7 April
CESE – Compressible Fluid Solver	8 April

ELECTROMAGNETISM (EM)

EM – Electromagnetism in LS-DYNA

This course provides an introduction to the Electromagnetics (EM) solver in LS-DYNA. Herein, the Maxwell equations are solved in the Eddy-Current approximation, which is suitable for cases where the propagation of electromagnetic waves in air (or vacuum) can be considered as instantaneous. The solver is coupled with the solid mechanics and thermal solvers of LS-DYNA allowing the simulation and solution of applications such as magnetic metal forming, welding, bending, induced heating, resistive heating and so forth.



The course includes a presentation of the solver's general principles and applications, a complete keyword description for setting up an Eddy-Current problem, an introduction to the more advanced features (Inductive heating problems, exterior magnetic field, magnetic materials and so forth) as well as an advanced description of the available controlling tools to ensure a safe analysis. Key electromagnetic concepts are reviewed throughout the course and a general knowledge about electromagnetics is therefore appreciated but not mandatory.

Contents
- Introduction and applications
- General principles
- Maxwell equations
- FEMSTER library
- FEM and BEM coupled system
- Setting up a EM problem step by step
- The EM timestep
- Circuits
- EM materials and equation of states
- Advanced functionalities
- Controlling and monitoring the analysis

Date: 5 April, 9:00 AM - 5:00 PM
Lecturer: Iñaki Çaldichoury (LSTC)
Fee: 550 € (275 € for research institutions)
students free of charge, if there are vacancies
Venue: DYNAmore Headquarters Stuttgart
Language: English
Registration: www.dynamore.de/em-e

INCOMPRESSIBLE FLUID DYNAMICS (ICFD)

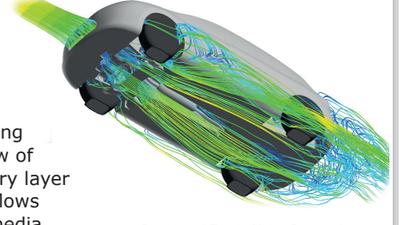
ICFD – Incompressible Fluid Solver in LS-DYNA

This course provides an introduction to the incompressible fluid solver (ICFD) in LS-DYNA. It focuses on the solution of CFD problems, where the incompressibility constraint may be applied, e. g. ground vehicle, aerodynamics, hemodynamics, free-surface problems, ship hydrodynamics, etc. The solver may run as a stand-alone CFD solver, where only fluid dynamics effects are studied, or it can be coupled to the solid mechanics solver to study loosely or strongly coupled fluid-structure interaction (FSI) problems.

The first day of the course includes a presentation of the general principles and applications of the solver, a step by step guide to setting up a simple CFD problem, advanced feature introduction (FSI, conjugate heat transfer) and so forth. A brief review of basic fluid mechanics and CFD concepts are also offered such that no expert knowledge of fluids is required. The second day will deal with the newly implemented features and advanced applications.

Content day 1
- General principles and supported applications
- Step by step keyword description
- Setting up a pure CFD problem for aerodynamics: setting boundary conditions, fluid volume mesher, mesh refinement tools
- Strong and loose FSI coupling
- Thermal coupling and conjugate heat transfer
- Computation of the heat transfer coefficient

Content day 2
- Advanced controlling and monitoring tools
- Turbulence modeling: new models and picking the right one, law of the wall, boundary layer
- Non Newtonian flows
- Flow in porous media
- DEM coupling
- Postprocessing with LS-PrePost



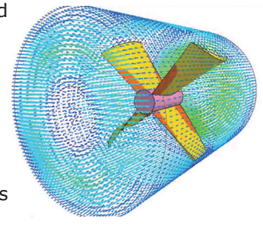
Courtesy of Toyota Motor Corporation

Date: 6-7 April, 9:00 AM - 5:00 PM
Lecturer: Iñaki Çaldichoury (LSTC)
Fee: 1.100 €, (550 € for research institutions)
day 1 and day 2 can be booked separately
students free of charge, if there are vacancies
Venue: DYNAmore Headquarters Stuttgart
Language: English
Registration: www.dynamore.de/icfd-e

COMPRESSIBLE FLUID DYNAMICS (CESE)

CESE – Compressible Fluid Solver in LS-DYNA

Compressibility effects in fluid mechanics are typically considered significant if the Mach number of the flow exceeds 0.3 or if the fluid undergoes very large pressure changes. The most distinct phenomenon associated with high speed flows is the existence of shock waves or non-isentropic solutions.



The new compressible flow solver CESE in LS-DYNA is based on a novel numerical framework originally proposed by Dr. Chang of the NASA Glenn Research Center. The method exhibits many non-traditional features, including a unified treatment of space and time, the introduction of a conservation element (CE) and a solution element (SE), and a novel shock capturing strategy without using a Riemann solver, which is able to simultaneously capture both strong shocks and small disturbances. Moreover, the spatial gradients are treated as unknowns which allows for more accurate solutions of the shock waves than normal second order schemes.

So far, this method has been used to solve many different types of flow problems, such as detonation waves, shock/acoustic wave interaction, cavitating flows, and chemical reaction flows. In LS-DYNA, it has been extended to also solve fluid-structure interaction (FSI) problems with the embedded (immersed) boundary approach or moving (fitted) mesh approach.

Contents
- Introduction
- General Principles
- The CE/SE scheme
- Setting up a pure CFD/CESE problem
- Setting up an FSI/CESE problem
- Advanced capabilities
- Post treatment
- Documentation

Date: 8 April, 9:00 AM - 5:00 PM
Lecturer: Iñaki Çaldichoury (LSTC)
Fee: 550 € (275 € for research institutions)
students free of charge, if there are vacancies
Venue: DYNAmore Headquarters Stuttgart
Language: English
Registration: www.dynamore.de/cese-e

REGISTRATION FORM

I herewith register for the seminar

☐ Electromagnetism in LS-DYNA, 5 April
☐ Industry: 550 € ☐ Research institution: 275 €
☐ Student: free of charge, if there are vacancies

☐ Compressible Fluid Solver in LS-DYNA, 6-7 April
☐ Industry: 1.100 € ☐ Research institution: 550 €
☐ I will attend only day 2 (half price)
☐ Student: free of charge, if there are vacancies

☐ Incompressible Fluid Solver in LS-DYNA, 8 April
☐ Industry: 1.100 € ☐ University: 550 €
☐ Student: free of charge, if there are vacancies

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First name: _____

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Date, Signature: _____

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All prices plus VAT.

Online registration at www.dynamore.de/seminars

Declaration of consent to the use of personal data:

With your registration you allow us the use and the processing of your data for the seminar organization and promotional purposes. You may, at any time, revoke your consent by contacting DYNAmore GmbH via phone or in writing.