

المعهد العالي للفنون
الهندسية

Online Course

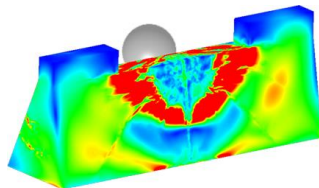
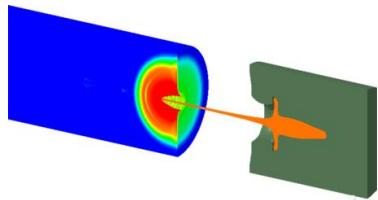
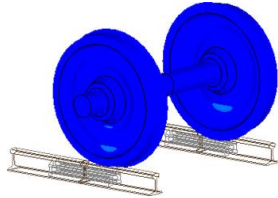
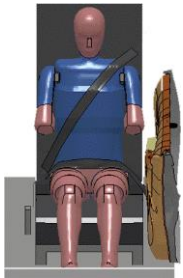
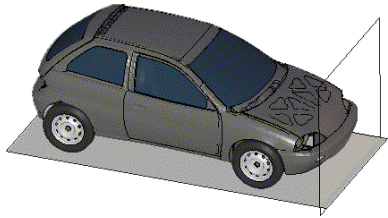
Simulation and Numerical Modeling of Engineering Problems using

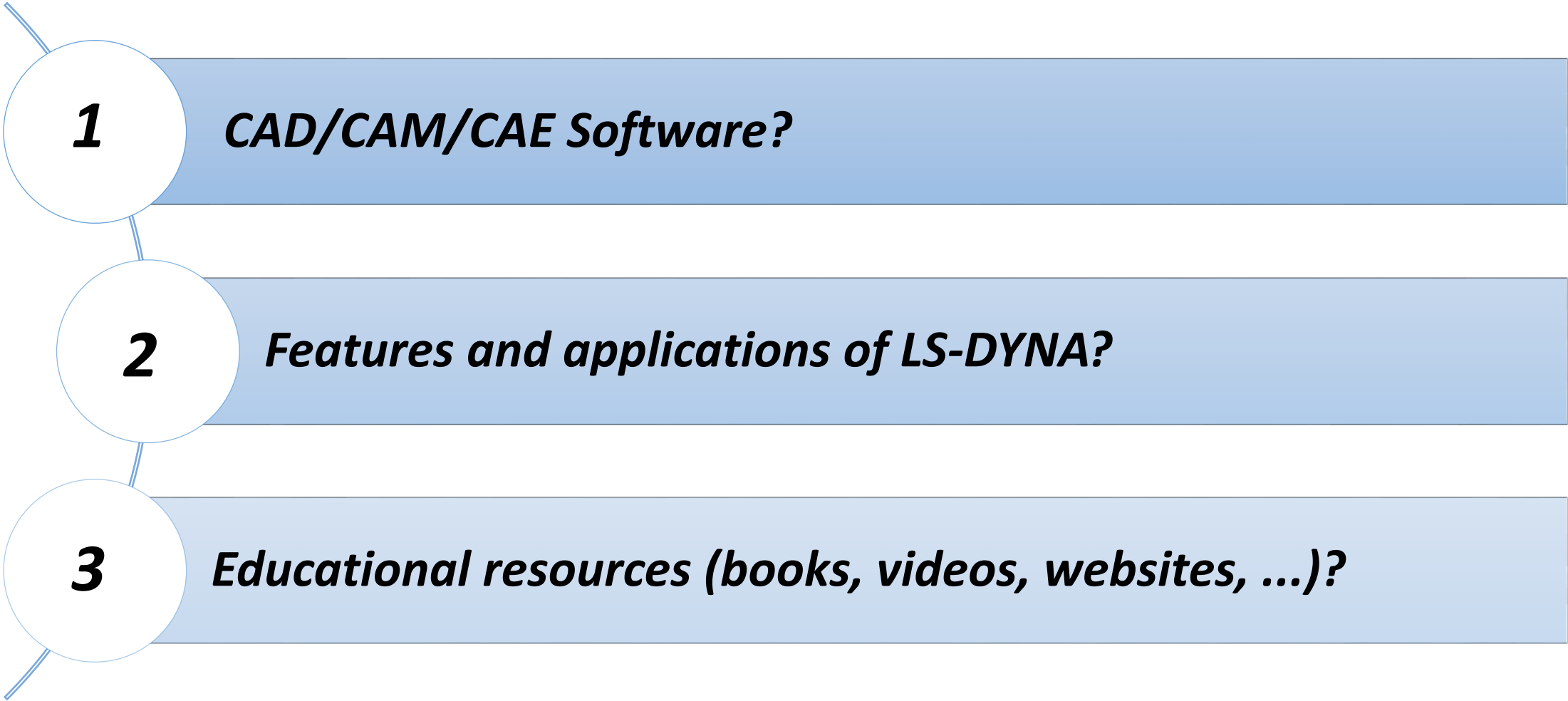
LS-DYNA

Course instructor

Ahmad Rahmati-Alaei

Assistant Professor, Department of Mechanical Engineering
National University of Skills (NUS), Tehran, Iran





1

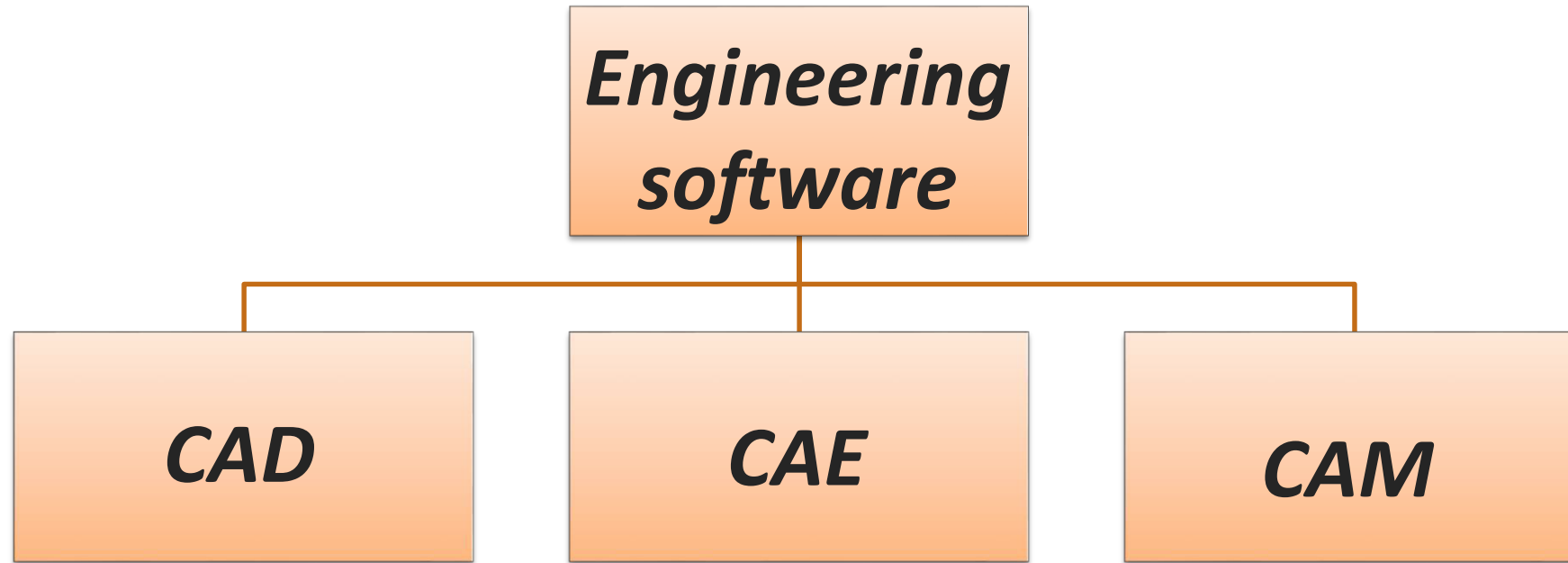
CAD/CAM/CAE Software?

2

Features and applications of LS-DYNA?

3

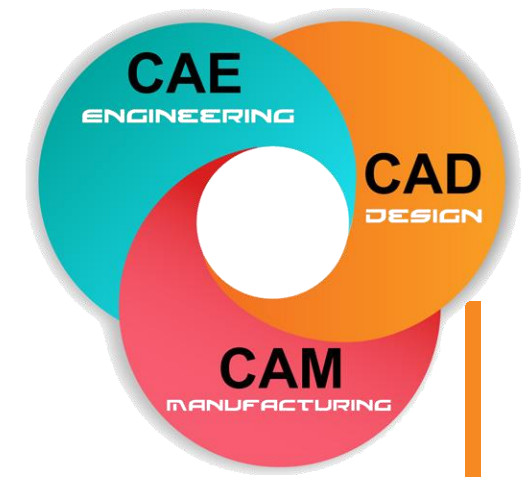
Educational resources (books, videos, websites, ...)?



Computer Aided **Engineering**

Computer Aided **Design**

Computer Aided **Manufacturing**



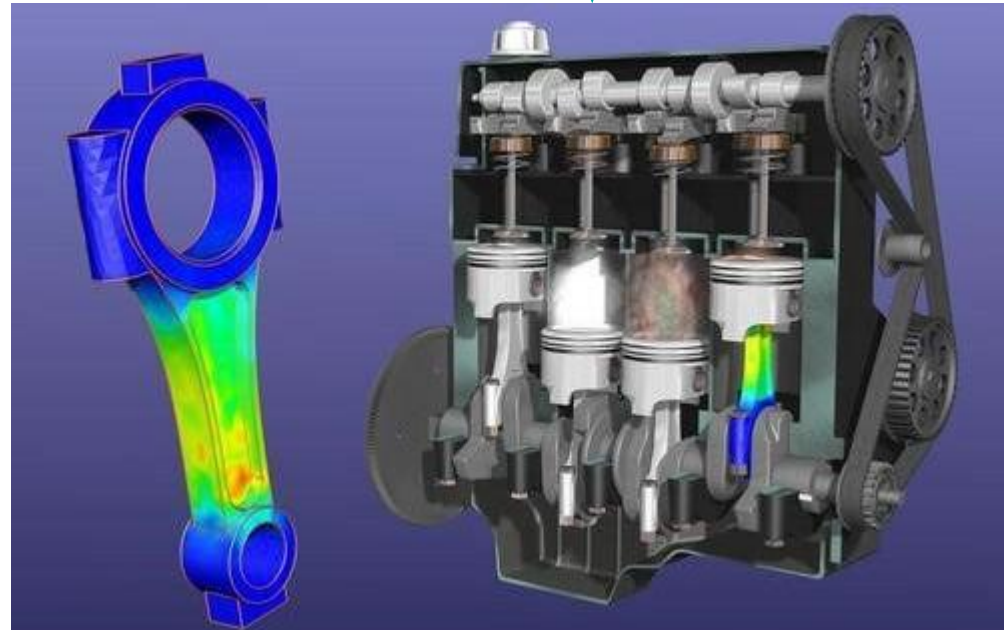
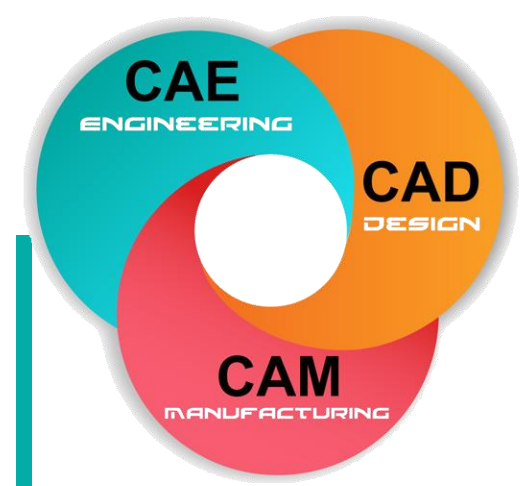
3D design of parts by software

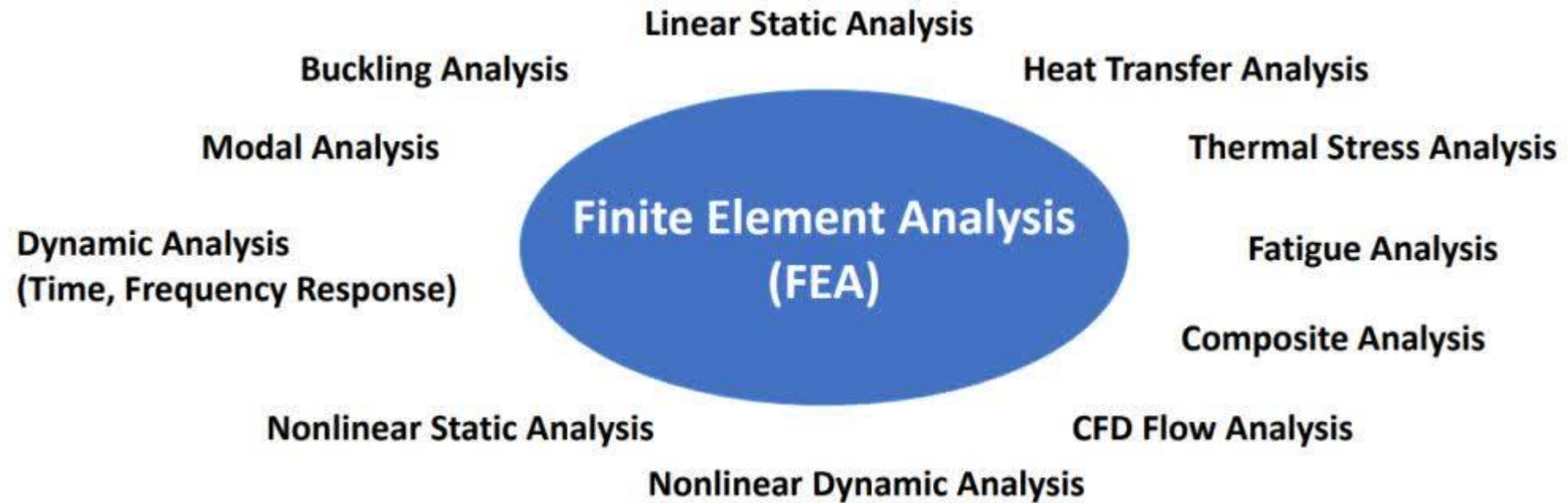
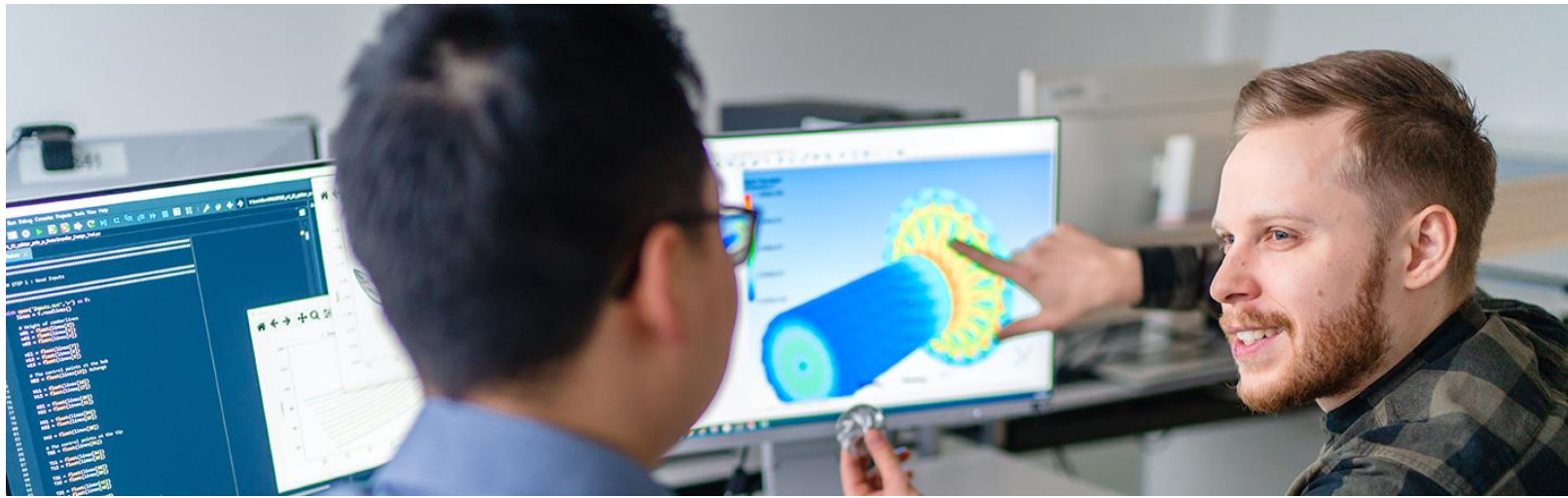


- Abaqus
- Ansys
- CFX
- Comsol
- Fluent
- HEEDS
- HyperWorks
- LS-DYNA
- Matlab
- Nastran

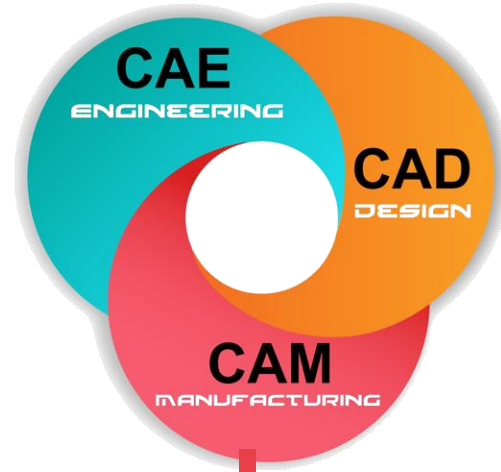
Engineering theories

- Finite Element Method (FEM)
- Finite Difference Method (FDM)
- Computational Fluid Dynamics (CFD)
- ...

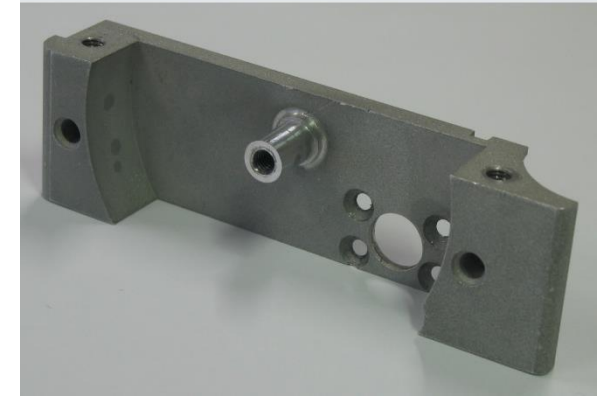
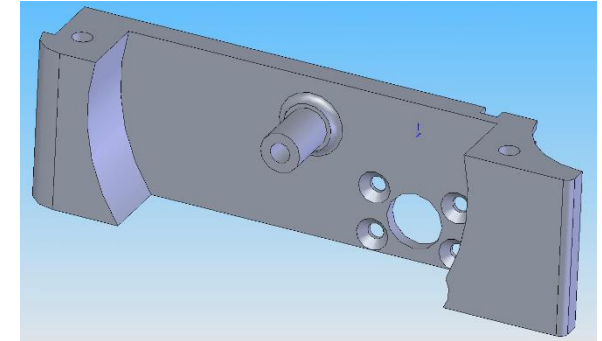


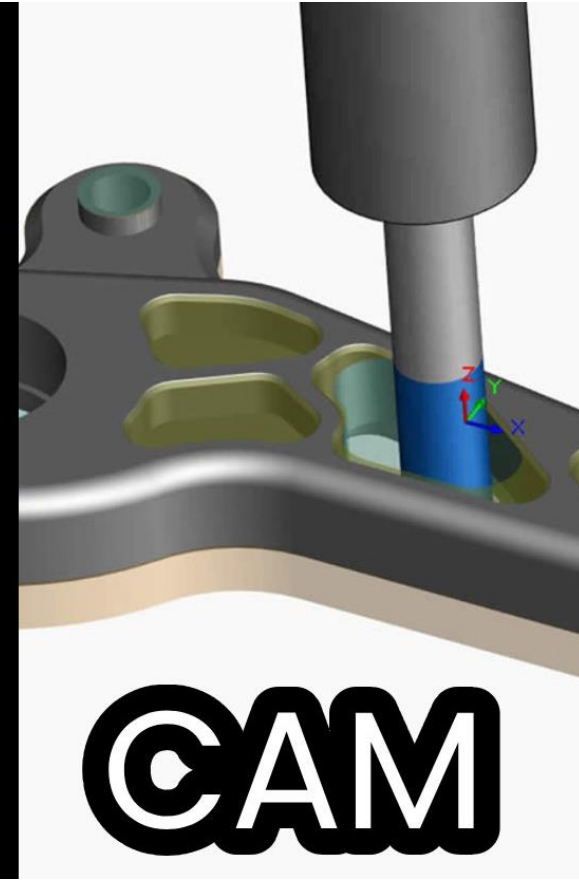
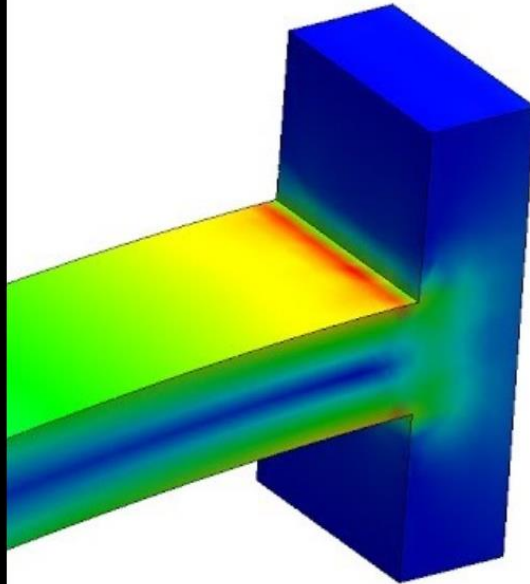


CNC Machine



Computer Aided
Manufacturing





Features and applications of LS-DYNA?

LS-DYNA is a set of numerical codes for the analysis of engineering problems. These problems can be classified as static, quasi-static or dynamic in the time domain. It can also be linear or non-linear in the field of material model behavior, boundary conditions and loading.



The basic theory of LS-DYNA software is Finite Element Method (FEM). Besides this numerical method, there are other methods such as Smooth Particle Hydrodynamic (SPH) and Element Free Galerkin (EFG) in LS-DYNA.

LS-DYNA software at a glance

Background theory



Finite Element, SPH , ...

Computational method



**Lagrangian, Eulerian, ALE
Implicit, Explicit**

Type of problem (time domain)



Dynamic, Static, Quasi-Static

The nature of the problem



Nonlinear, Linear

Software name



DYNA3D, LS-DYNA3D, LS-DYNA



Memories of Dr. Alfred Zinner, who would have been 100 in 2020
FEM pioneer and trailblazer in the automobile industry



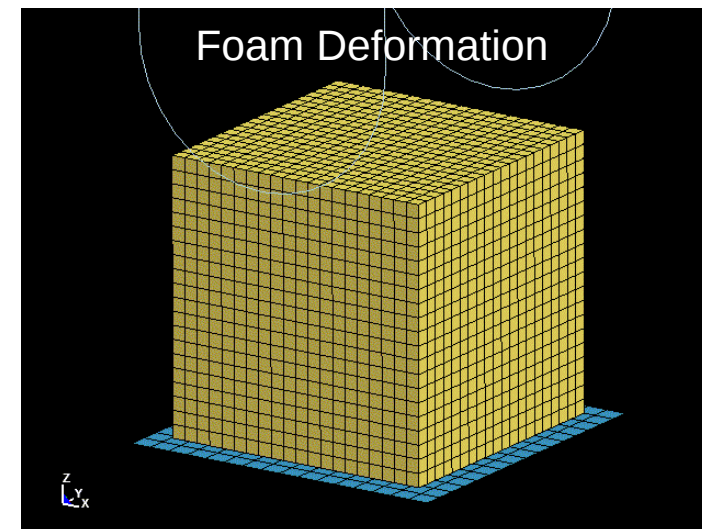
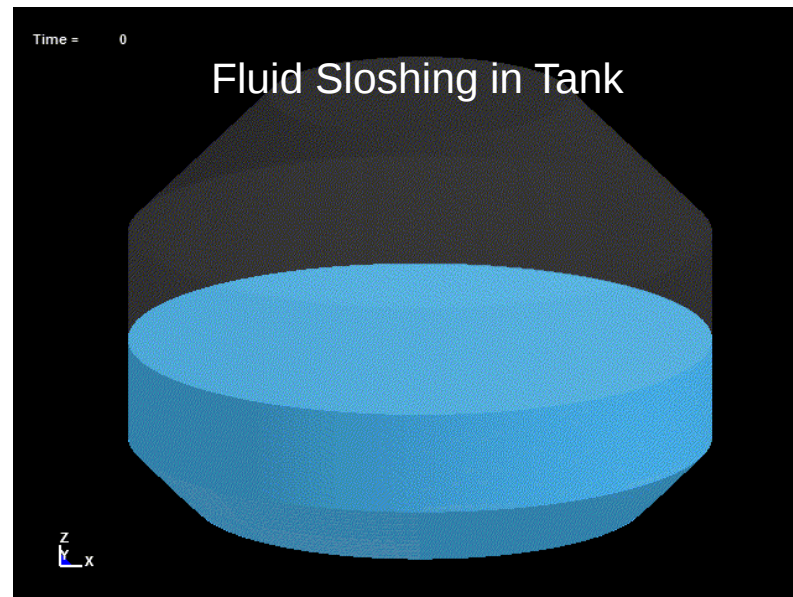
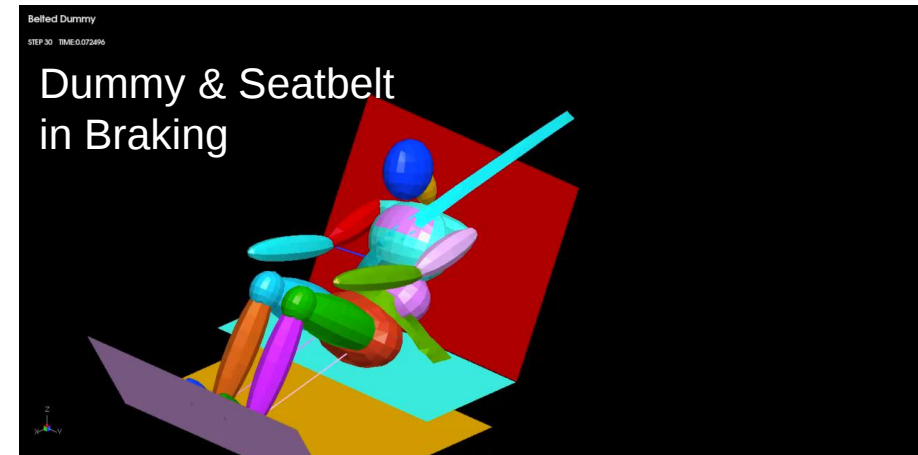
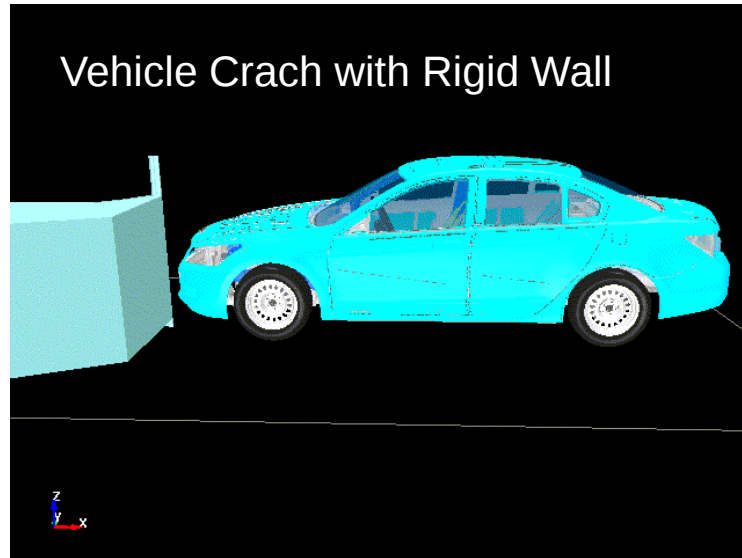
Guenter Muller (CADFEM), Warner Dirschmid (AUDI), John Swanson (ANSYS), Alfred Zimmer (Daimler-Benz) and John Hallquist (LSTC)

Engineers and users

- Mechanical Engineering
- Aerospace Engineering
- Automotive Engineering
- Railway Engineering
- Civil Engineering
- Mining Engineering
- Metallurgical Engineering
- Biomechanical Engineering
- Military Engineering

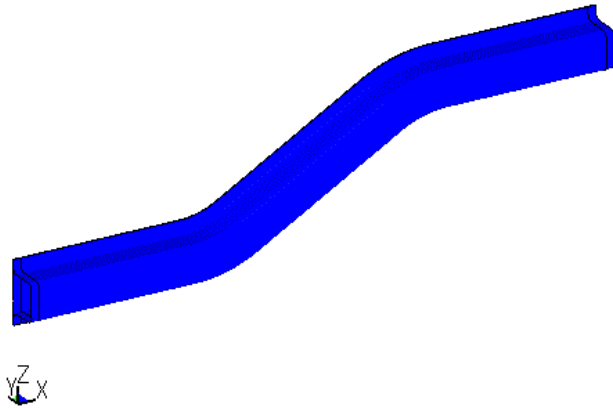


Example of simulations with LS-DYNA

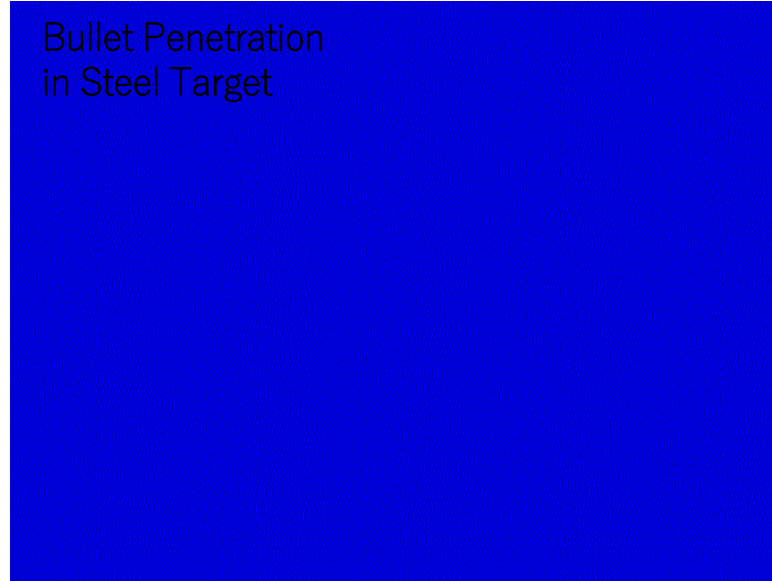


Example of simulations with LS-DYNA

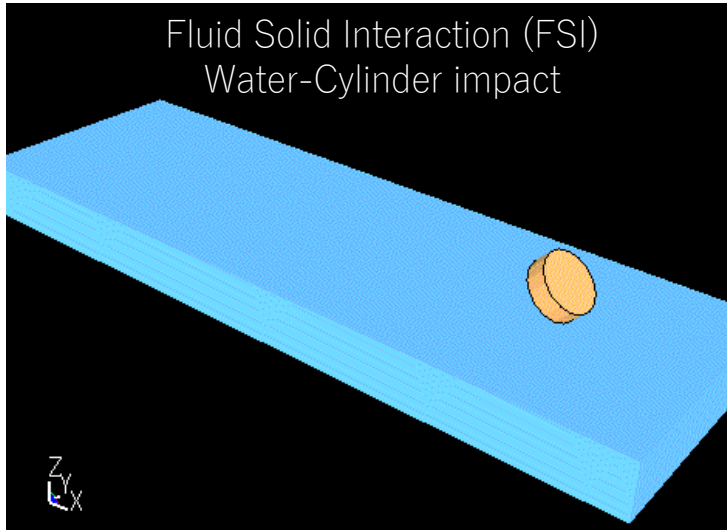
Vehicle CrashBox Folding



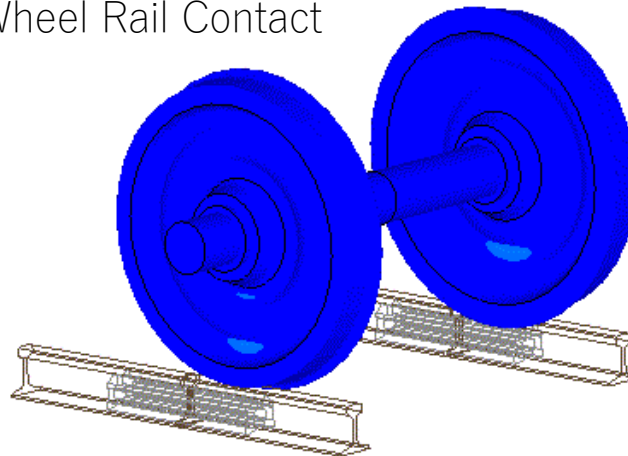
Bullet Penetration
in Steel Target



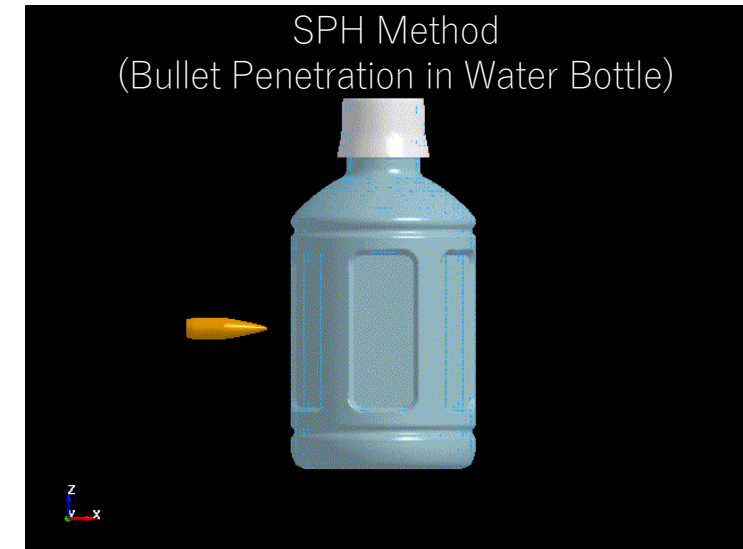
Fluid Solid Interaction (FSI)
Water-Cylinder impact



Wheel Rail Contact

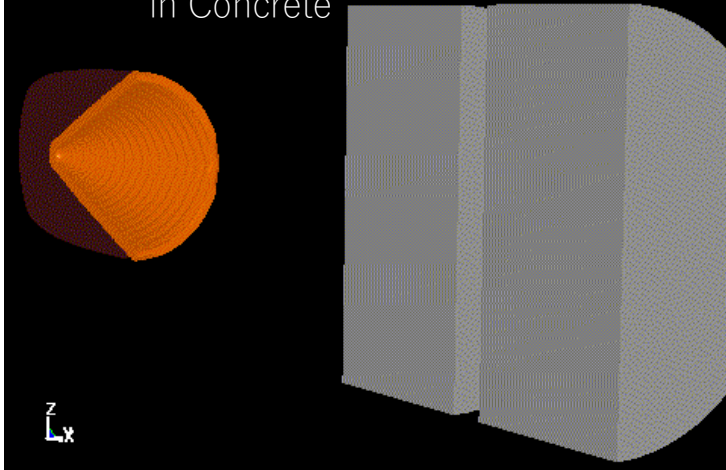


SPH Method
(Bullet Penetration in Water Bottle)

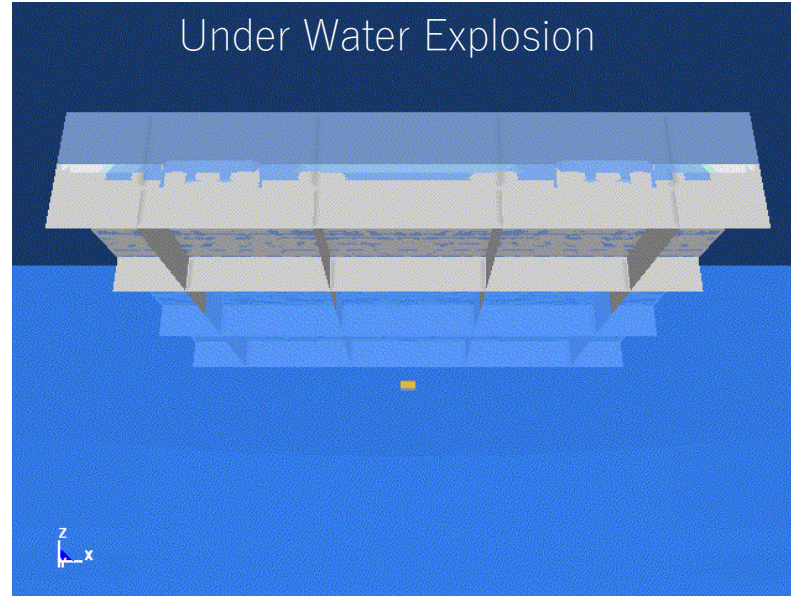


Example of simulations with LS-DYNA

Shaped Charge Penetration
in Concrete



Under Water Explosion

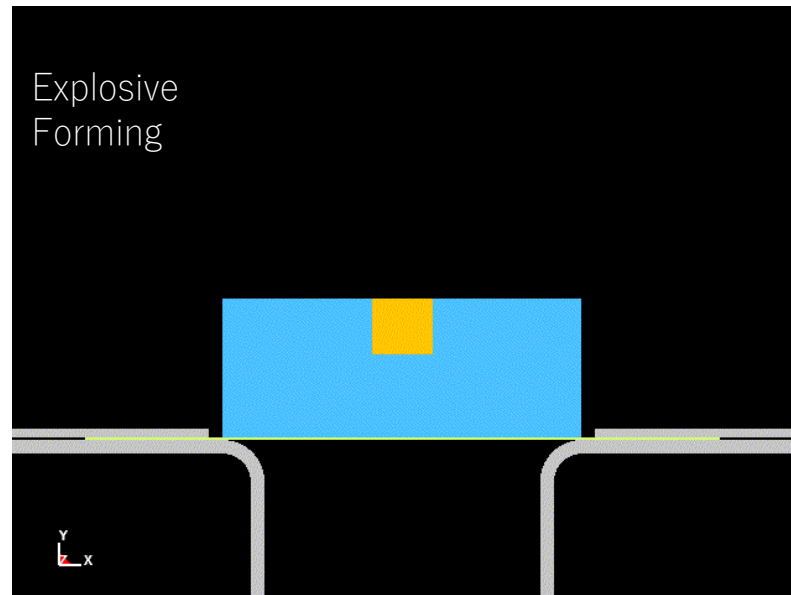


Blast Problem

Air Explosion under Vehicle



Explosive
Forming





HONDA



TOYOTA



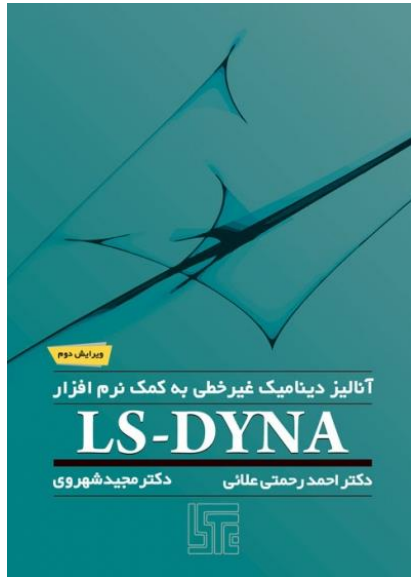
HYUNDAI

DODGE 



LS-DYNA
for
Automotive Companies

Educational resources

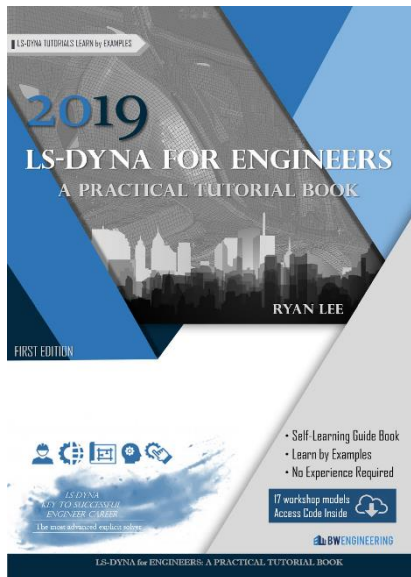


Nonlinear Dynamic Analysis using LS-DYNA Software

Author: Dr. Ahmad Rahmati-Alaei, Dr. Majid Sharavi

Publisher: Daneshbonyad

Language: Persian

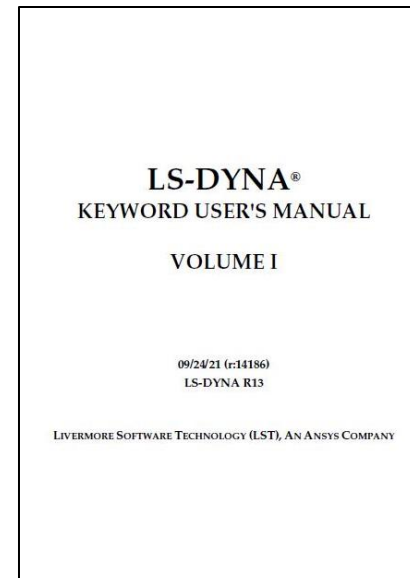


LS-DYNA for Engineer: A Practical Tutorial Book

Author: Ryan Lee

Publisher: BW Publications

Language: English



LS-DYNA KEYWORD USER'S MANUAL

Publisher: LSTC

Language: English

Educational resources



Website	Content
Lsdyna.Ansys.com	The official website of the LSTC company
Dynasupport.com	Support for software users and answers to frequently asked questions
Dynaexamples.com	Basic examples in different sections for users
Dynalook.com	Conference papers that include specialized simulation with LS-DYNA
Ftp.Lstc.com/user	Download software modules and other practical training
Lancemore.jp/ls-dyna/Index_en.html	Animation examples of simulations with LS-DYNA

Educational resources



Social Groups And Networks

Type		Address	Content
Group (Google)		Groups.Google.com/g/ls-dyna2	Community for discussion and exchange of ideas, tips and applications of LS-DYNA
Group/ Channel (Telegram)		t.me/FEM_LSDYNA	



***Discuss and Exchange your Experiences
With Other Users of LS-DYNA***





Course instructor

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