



# 15th LS-DYNA International Conference & Users Meeting

## Pre-Conference Training (1 day)

Sunday, June 10, 2018, 9am-5pm

*Edward Hotel & Convention Center, Dearborn, MI*

## Introduction to Isogeometric Analysis

**Instructor:** David Benson, Stefan Hartmann

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**Prerequisite:** Students should be familiar with LS-DYNA

### Objective

This one day class provides an introduction into Isogeometric Analysis (IGA) with Non-Uniform Rational B-Splines (NURBS) in LS-DYNA. Some theoretical background about IGA and NURBS will be presented before exploring the current capabilities in LS-DYNA. Starting from some CAD-file the setup of a suitable model using LS-PREPOST will be exercised. The class will deal with shells and solids with the main focus on shells.

### COURSE CONTENT

#### Contents:

- Introduction and Motivation
- Theoretical background
  - B-Splines
  - NURBS
  - Other CAD-descriptions
- NURBS surfaces
  - untrimmed NURBS patches
  - Trimmed NURBS patches
- NURBS-based shell formulations
  - Reissner-Mindlin shell
  - Kirchhoff-Love shell
  - Hybrid shell
  - Keyword description
- Application of boundary conditions
  - Interpolation nodes and elements
  - Contact with interpolation elements
  - Contact with NURBS elements
  - Spotweld modeling
- Joining of patches
- Matching untrimmed patches
- Non-matching untrimmed patches
- Trimmed patches
- Model setup
  - Import IGES/STEP file and create NURBS patches in LSPP
  - NURBS Tool in LSPP
  - Necessary keywords
- Post-Processing
  - Via interpolation elements
  - IGAPLOT-file
- Examples
  - Benchmarks
  - Forming simulations
  - Others
- NURBS-based solids in LS-DYNA
  - Current capabilities
  - Necessary keywords
  - Model setup
  - Examples
- Discussion and outlook

For further information regarding pre- and post-conference training, please consult the conference website [www.ls-dynaconferences.com](http://www.ls-dynaconferences.com) or send email to [ConfTraining@lstc.com](mailto:ConfTraining@lstc.com).