



MARCH 6, 2014

Future@SystemX

ISOGEOMETRIC METHOD FOR OPTIMAL DESIGN OF SHELL STRUCTURES

A NOVATIVE AND EFFECTIVE APPROACH

SARAH JULISSON



ANR

île de France

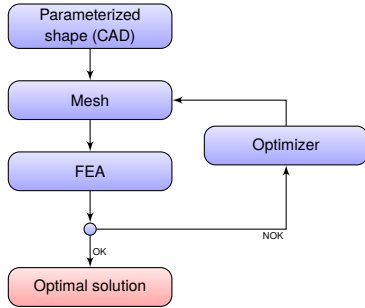


Campus Paris Saclay
FONDATION DE COOPÉRATION SCIENTIFIQUE

SYSTEMATIC
PARIS REGION SYSTEMS & ICT CLUSTER



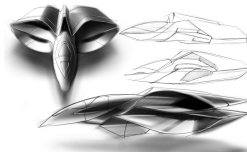
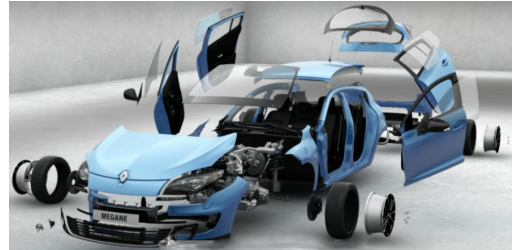
THE STANDARD PROCESS



✓ Standard method in design departments

- ✗ Setting-up difficulties
- ✗ Return to CAD
- ✗ Surface parameters
- ✗ Mesh quality
- ✗ Need expertise

SHELL STRUCTURES

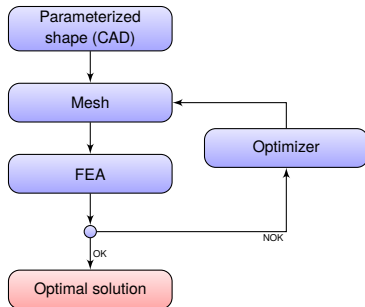
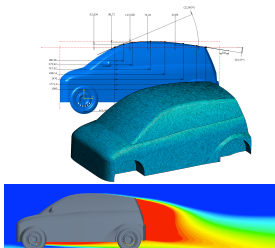


MAIN OBJECTIVES

- ◆ Maximize the design space exploration
- ◆ Simplify the optimization process
- ◆ Improve simulations quality

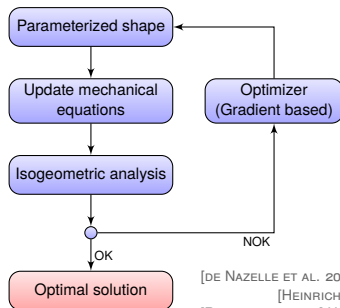
STANDARD APPROACH:

CAD / MESHING SOFTWARE / SOLVER / OPTIMIZER



ISOGEOMETRIC APPROACH:

BOTH INTEGRATED AND INNOVATIVE



[DE NAZELLE ET AL. 2012] RENAULT / ECL

[HEINRICH ET AL. 2011] INRIA

[REALI ET AL. 2007] UNIVERSITY OF PAVIA

[HUGHES ET AL. 2005] UNIVERSITY OF TEXAS AT AUSTIN

OPTIMIZATION CRITERIA

- ◆ Mass
- ◆ Stiffness
- ◆ Vibro-acoustic
- ◆ Fatigue
- ◆ Buckling
- ◆ Material optimization (eg. composite)



STANDARD MATERIALS: THERMAL SCREEN



COMPOSITE MATERIALS: SUSPENSION WISHBONE