

# Structural integrity under extreme loads

## Topic: Reduced order models

### TITLE: Reduced order models applied to impacts engineering

#### RESEARCH BACKGROUND:

Impact analyses are highly nonlinear and should be solved using explicit algorithms which are time consuming. In recent years reduced order models (ROMs) techniques are gaining momentum for multi queries simulations to alleviate the computational burden of such numerical problems. The aim of this thesis is to define a ROM workflow that is able to replicate the nonlinear dynamics of impact on helmets as full order model (FOM).

#### RESEARCH ACTIVITIES:

1. Literature review on reduced order models (focus on non intrusive methods)
2. Numerical implementation of simple benchmark cases
3. Model reduction of blunt impact on helmets (training phase)
4. Numerical assessment of reduced models and error estimation (online phase)

#### METHODOLOGY: Numerical

**DURATION:** 9 months

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