



# ODYSSEE - Explore new industrial horizons

## Optimal Decision Support System for Engineering and Expertise

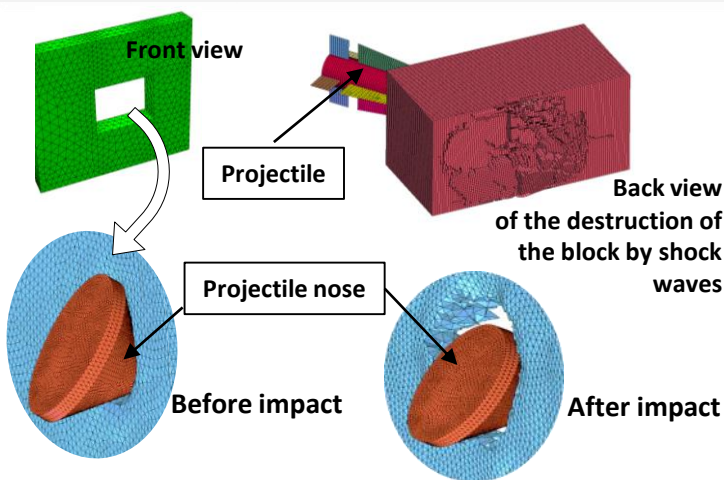
### Case study - Defence : FE explosion model replaced by a reduced model

#### Projectile impact on a structure

This case study consists of representing the impact of the projectile on a structure by a "reduced" model, responding in real time and giving an equivalent response.

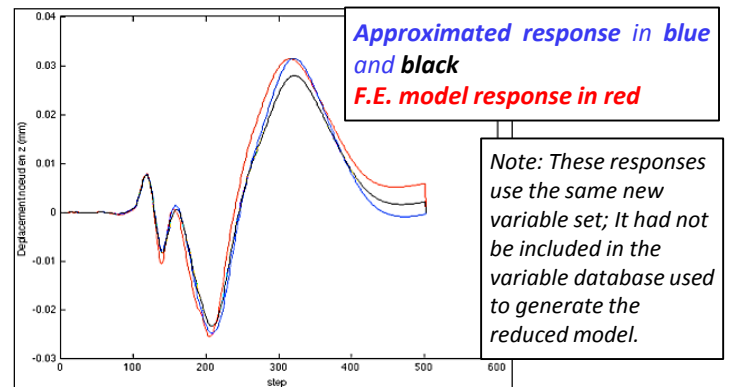
The global model finite elements is broken down into 3 sub-systems:

- An cut out impact zone (green paving stone with no center)
- The nose of the projectile + the center zone of impact (blue zone) that fills the plane of impact
- A structural block representing the rest of the cut out zone of impact (red block)



#### Reduced Models versus FE models

The parameters used for generating the database (DOE) are the projectile velocity, the angle of impact and its length. The studied response is the propagation of the shock wave over time on the wall surrounding the impact target.



#### Reduced model with ODYSSEE

CADLM proposes the reduced model with Lunar module integrated in ODYSSEE platform.



ODYSSEE, is an innovative platform with a rapid ROI, allowing to build specific tools involving industrial data analysis.

Available as stand-alone modules, it allows to adapt easily to your needs without superfluous options. This optimal decision support system tool based on machine learning technics developed by CADLM was the winner of the 1<sup>er</sup> price innovative product in 2015, voted by the public at the systematic convention.

#### Why ODYSSEE ?

- Predicting behaviour in real-time ;
- Automation of industrial processes ;
- Decision support ;
- Saving time in complex process execution ;
- Saving time by designing embedded reduced model ;
- Saving time in correlation experiments /calculation ;

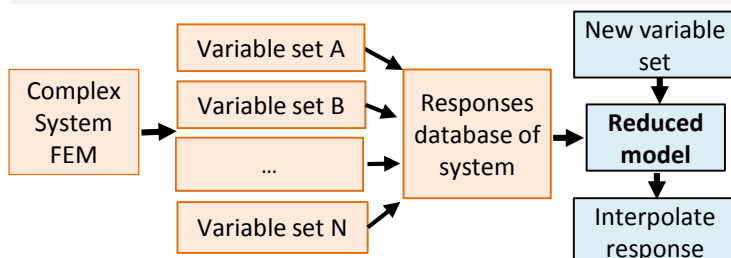


CADLM proposes various services around ODYSSEE, customized or your problem and accompanies you to find the best solution to your problem (Studies, Customized products, Training).

#### Reduced model concept

A reduced model is a representative model of a complex time-dependent system with associated variables and corresponding responses. Thus the complex and heavy (in terms of resolution time) FE model may be replaced by the reduced model. The algorithms used by CADLM help to maintain accurate system results. This one leads to the possibility to interpolate responses for new variables.

Contrary to response surface methods, which converge as number of tests increase, reduced models are shown to converge much faster requiring less computations (enough to extract the dominating modes).



#### Strengths of reduced model :

- Real-time behaviour prediction (time saving)
- On-board (Limited computing resource)

These models are useful and efficient for parametric studies, optimization, real-time simulation, etc.

#### Conclusion

A reduced model gives a good idea of results for an industrial process and accelerates research and design of new products.

A reduced model can be used in different industries : Automotive; Aerospace and Defence; Consumer products; Manufacturing; Civil engineering and Energy; Healthcare.

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