

# Ditching simulation of Air and Space vehicles using ALE methods

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The impact on water of an aircraft or a re-entry vehicle is an important issue for both air and space industry.

To limit the risks of loss of the vehicle, a prediction of its structural behaviour under various possible ditching configurations must be performed.

Given the costs involved, structural tests must be limited in scale and numbers, so numerical simulations may be of great help for this purpose.

Numerical simulations aim at predicting:

- The trajectory of the vehicle under impact
- The pressure repartition on the body
- Stress and possible damages to the structure.

Physically, two types of configuration involving different phenomenon can be identified :

- Vertical impacts
- Impacts with high horizontal components, where air entrapment, ventilation and cavitation may appear and be the dimensioning factors.

The purpose of this presentation is to give an overview of the possibility of ALE transient dynamic explicit simulation methods to perform such simulations :

- Fluid dynamic calculations
- CPU and model size reduction techniques
- Fluid-Structure contact modelling

Example of such simulations, compared to tests, will be presented using the FE code Radioss

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