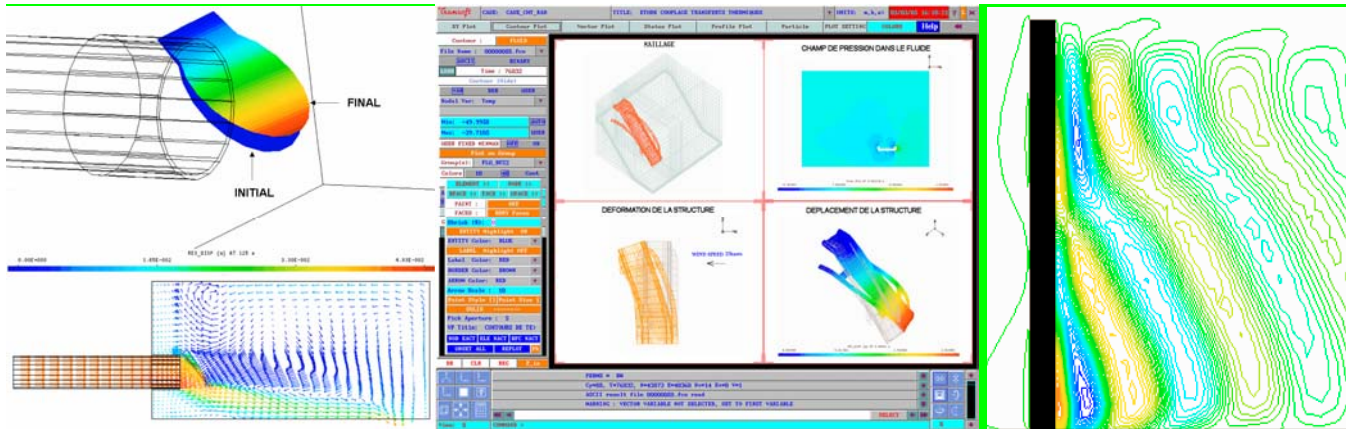
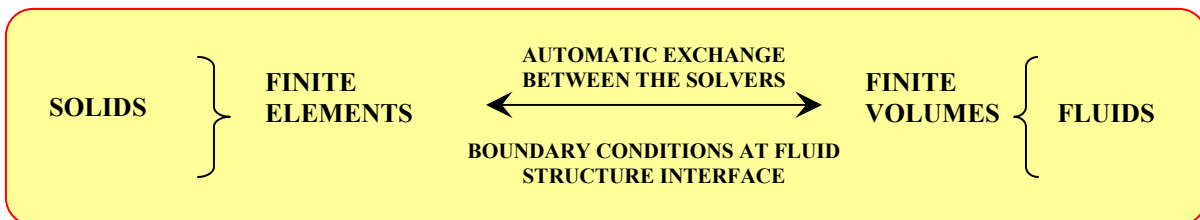


FLUID - STRUCTURE INTERACTIONS



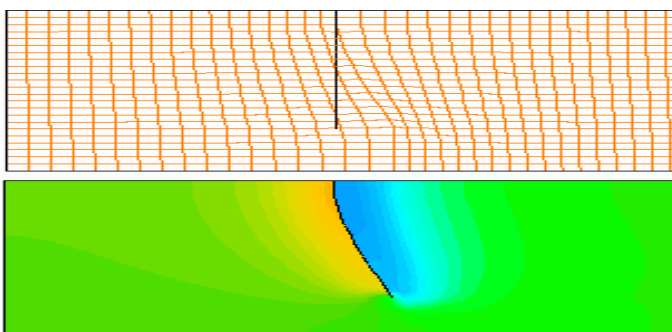
fluidyn-MP-FSI (Fluid Structure Interaction) is a fluid mechanics software to simulate fluid structure coupling. It simultaneously calculates the **mechanical stress** and **vibration phenomena** in the structures and the **flow** in the fluids in contact.

fluidyn-MP-FSI models the multi-physics interactions by an innovative method which includes the strong coupling of advanced solution techniques for each study domain : **Finite Volumes (FV)** for fluid flow calculations and **Finite Elements (FE)** for structures. For each of these solution techniques, **several numerical schemes** are available to adapt the software to the problem.

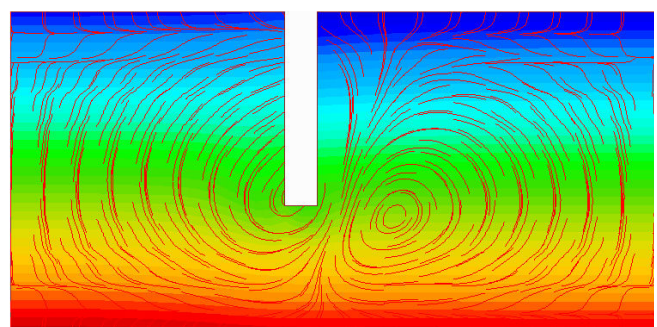


The strong coupling characteristic of the robust fluid and structure solution methods and the availability of various numerical schemes helps to give precise and dependable results in an optimised amount of computational time.

The fluid mesh in contact with the structure deforms automatically (**auto-adaptive mesh**) following the structural deformation. The transient phenomena are simulated with precision due to the permanent information exchange between the two solvers (FV et FE).



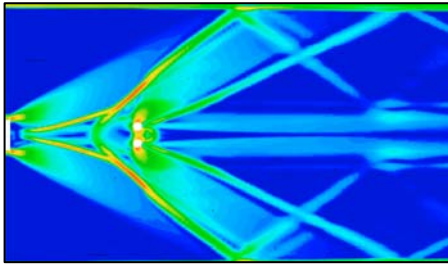
Pressure fields in the fluid and associated mesh deformation



Stream lines following a structural displacement

MULTIPLICITY OF SOLVERS AND SOLUTION SCHEMES

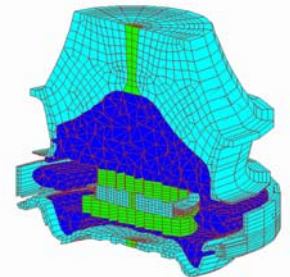
A highly adaptable and precise solution to each problem is possible thanks to the vast selection of appropriate solvers and numerical schemes offered by *fluidyn-MP FSI*.



FLUID MODELLING

- ◆ Steady incompressible to highly unsteady and strongly compressible (detonation, shock waves).
- ◆ Multi species, multi phase flows (dispersed or free surface).
- ◆ Various equations of state for thermodynamic properties
- ◆ Various simple to highly evolutive turbulence models
- ◆ Reactive flows with different reaction models.

- ◆ Radiation in semi-transparent media.
- ◆ Structured, unstructured, hybrid, non-conform, moving mesh.
- ◆ Porous media (surface or volume porosities).

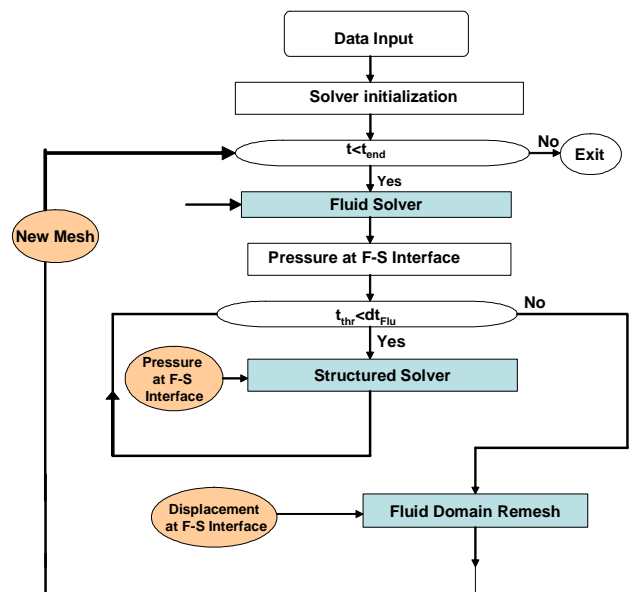


STRUCTURAL MODELLING

- ◆ 3D complex structures in finite elements
- ◆ Hexahedral, tetrahedral or thin plates, beams and springs elements.
- ◆ Transient (implicit or explicit scheme) or static analysis.
- ◆ Stress and deformations linked to heat load taken into account.
- ◆ Laws of behaviour of elastic, elasto-plastic or piece wise linear materials and isotropic or orthotropic behaviour.
- ◆ Laws of plastification and damage (Steinberg Guinan, Johnson-Cook) available.

MODELLING FLUID STRUCTURE INTERACTIONS

fluidyn-MP-FSI offers a new technology of strong fluid structure coupling. The exchange of boundary conditions between the Finite Elements and the Finite Volumes domains is automatic. The fluid mesh is rebuilt automatically to follow the deformation of the fluid-structure interface.



POST-PROCESSOR

The user-friendly graphical interface of *fluidyn-MP FSI* allows result visualisation and interpretation at any point during the simulation as well as the easy creation of images and result animations.

USER REFERENCES

AIR LIQUIDE, AVENTIS, CEA, CIAT, CITA, Cogentrix, DGA, EADS, EDF, Framatome, IFP, Mitsubishi, RATP, Saint-Gobain, Shell, SNCF, STBFT, Sumitomo, TOTAL, VNF, Zodiac, etc.

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