TransAT

The new concept of Computational Aerodynamics of land-based and space vehicles

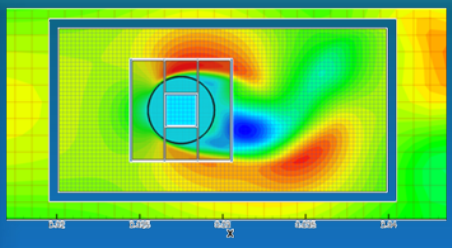
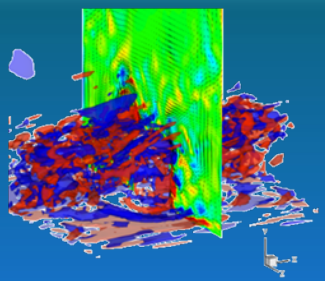
Aerodynamics & Propulsion



ASCOMP GmbH *provides consulting services in aerodynamics and propulsion. Our activities range from studying resistance forces of vehicles, to turbo-machinery flows and fuel-jet break-up and atomization in combustion chambers.*

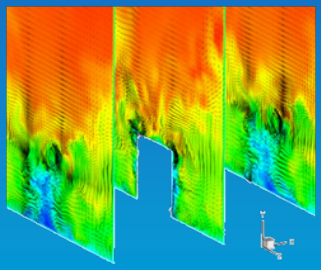
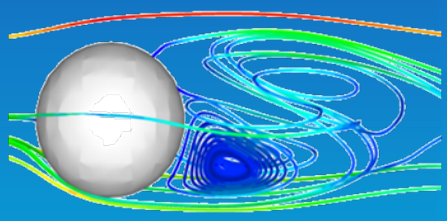
Grid generation requires a tremendous time in CFD. While unstructured grids have somewhat helped invert the tendency, these techniques still need to be coupled to structured meshes for boundary layers. The IST/BMR functionality of TransAT has solved the grid generation problem: CAD geometries are mapped into a Cartesian grid and treated as immersed surfaces, saving up to 70% cells in in 3D flows.

Trans*AT* *allows predicting 3D external aerodynamics flows for land, sea and space-based vehicles. TransAT uses both RANS and high-fidelity LES and V-LES, with various turbulence and SGS models, for high and low-Re flows.*

- ***Steady state RANS***
- ***High & Low-Re models***
- ***Algebraic & anisotropic models***
- ***LES & V-LES****
- ***Particle Laden flow***
- ***Conjugate heat transfer***

Fast and innovative multi-block and multi-grid meshing technology based on IST/BMR* ... can save up to 75% grid nodes in 3D.

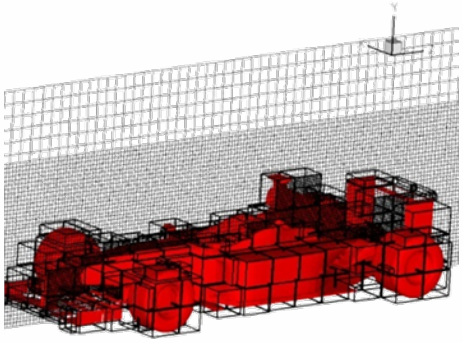
****IST/BMR: Immersed Surface Technology / Block Mesh Refinement***
*****LES & V-LES: Large Eddy Simulation & Very Large Eddy Simulation***

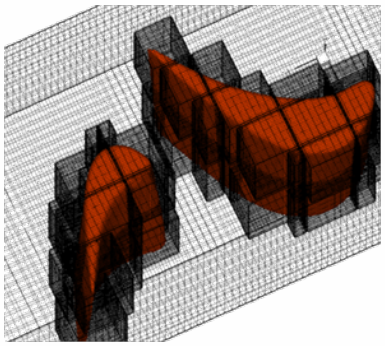
ASCOMP GmbH software package **Trans*AT*** (Transport phenomena Analysis Tool) can simulate a wide range of laminar and turbulent flows, using a hierarchical problem-oriented modelling strategy: RANS, V-LES and LES . **Trans*AT*** is particularly designed to predicting turbulent flows dominated by large scale motions (separation and shedding). **Trans*AT*** masters the LES and V-LES for aerodynamics of external flows, with various SGS and subscale models, for high and low-Re flows.

TransAT is perfectly suited for 3D external aerodynamics flows for land, sea and space-based vehicles. TransAT uses RANS, LES and V-LES, with various turbulence and SGS models, for high and low-Re flows.

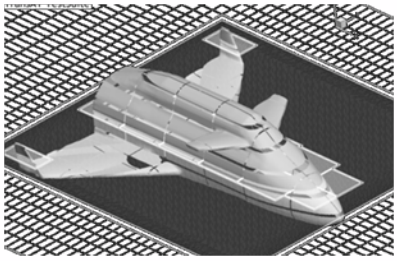
Land based vehicles and machines:

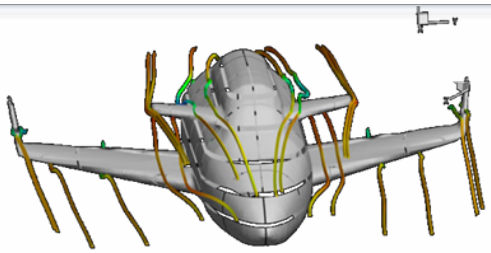
Grid generation is known to require up to 70% time of the simulation process. Although unstructured grids have somewhat helped invert the tendency, these techniques still need to be coupled to structured BFC meshes for the boundary layer. The IST/BMR functionality of TransAT has solved the grid generation problem, whereby all sorts of geometries are mapped into a Cartesian grid. Land-based aerodynamics problems are now solved (in 3D) very simply.

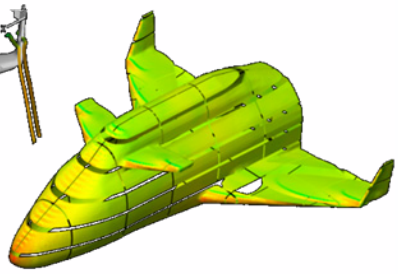




'Re-entry' of space shuttle:



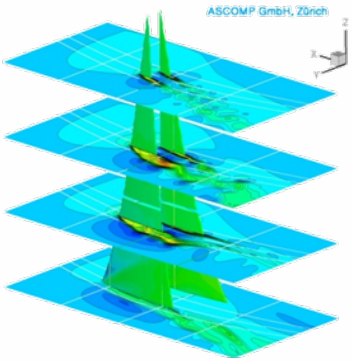


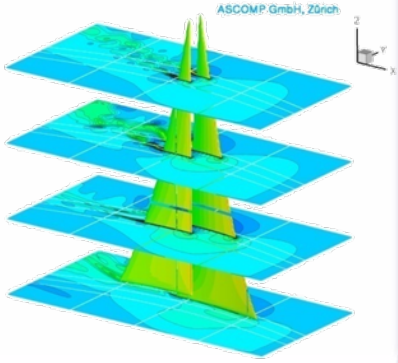


The phase of a spaceflight during which the craft leaves earth orbit and descends through the upper atmosphere is known as're-entry'. During this phase the shuttles experiences high thermal loads to which it must resist to avoid break-up, using, e.g., thermal shields. CFD is not only concerned with optimization resistance forces of the vehicle, but also with the thermal management issue. The IST/BMR technique allows predicting coupled conjugate heat transfer and external turbulent flow.

Sails aerodynamics:

Flow in yacht sails is complex, in particular in the Genoa; sailing downwind is a simpler flow problem to model. But various issues are still open, such as the prediction of the leading edge separation of both sails, the re-attachment of the boundary layer downstream, the trailing edge separation on the suction side of the genneker because of the retarding pressure gradient. TansAT solves these flows in an unsteady manner (LES or V-LES) in order to provide as faithful picture of real sea conditions.





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