SIEMENS
Ingenuity for life

Simcenter FLOEFD Advanced module

Providing design engineers with access to special physics capabilities

Benefits

- Provide access to special physics capabilities
- Create more realistic simulations and obtain more accurate results
- Access more functionalities in the areas of combustion and hypersonic analysis
- Work with your preferred CAD platform

Summary

Simcenter™ FLOEFD™ software is a frontloading computational fluid dynamics (CFD) software. It is designed to work directly inside popular computer-aided design (CAD) software, so users can simulate airflow and heat transfer using 3D models without translating data or making copies.

The Simcenter FLOEFD Advanced module provides additional capabilities for special analyses. It enables you to create more realistic simulations and obtain more accurate results, access more functionalities in the areas of combustion and hypersonic analysis and work on your preferred CAD platform.

Physical capabilities include:

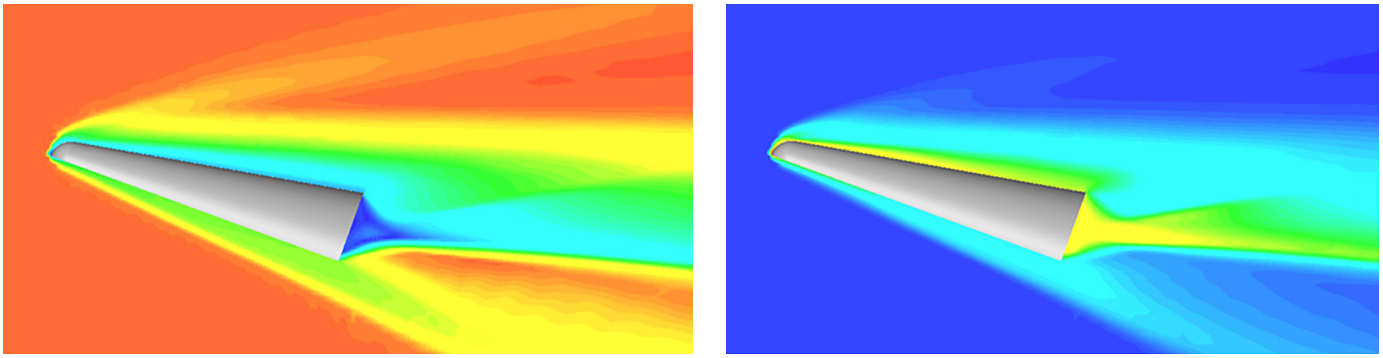
Combustion modeling and analysis
The Simcenter FLOEFD Advanced module can be used to account for the thermal effects of combustion of gas-phase mixtures:

The equilibrium approach is used for non-premixed combustion (combustion starts immediately and rapidly upon mixing).

A limited combustion rate exists for premixed combustion that requires an igniter to start the combustion. There are 26 fuels and five predefined oxidizers.

Mass fraction of the combustion can be visualized for:

- Carbon monoxide (CO)
- Carbon dioxide (CO_2)
- Nitrogen (N_2)
- Nitric oxide (NO)
- Nitrogen dioxide (NO_2)
- Sulfur dioxide (SO_2)
- Water (H_2O)
- Residual fuel
- Residual oxidizer
- Combustion products

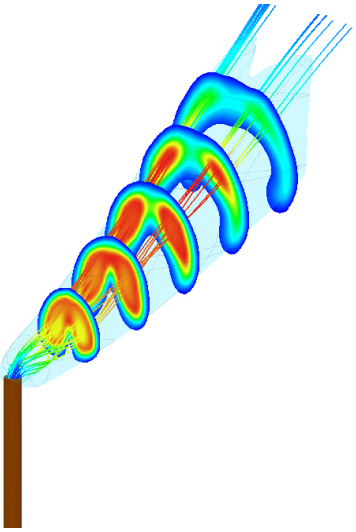


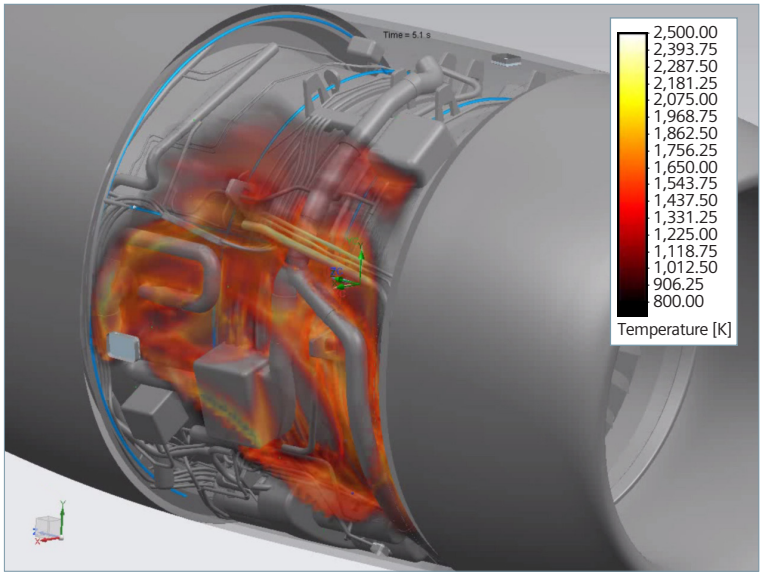
Mach 6 at an angle of attack of 20 degrees. Mach number distribution (left) and temperature field (right).

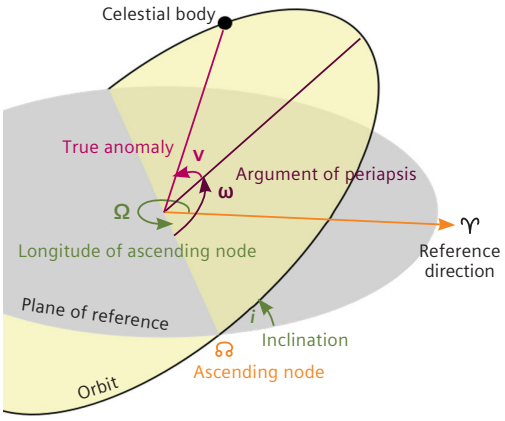
Simcenter FLOEFD Advanced module

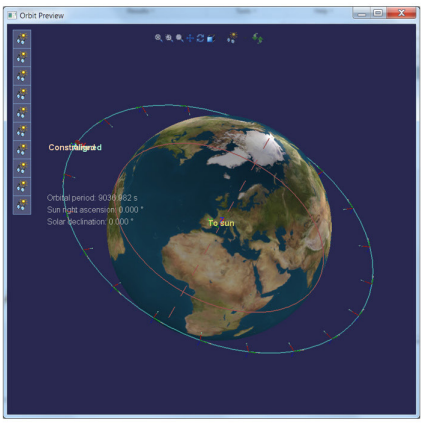
Radiation in combustion process
For a more accurate thermal simulation in combustion cases, the radiation of dominating radiating combustion products H_2O and CO_2 are taken into account. This option requires the discrete ordinate or Monte Carlo advanced radiation model and therefore the Simcenter FLOEFD HVAC or Simcenter FLOEFD LED module.

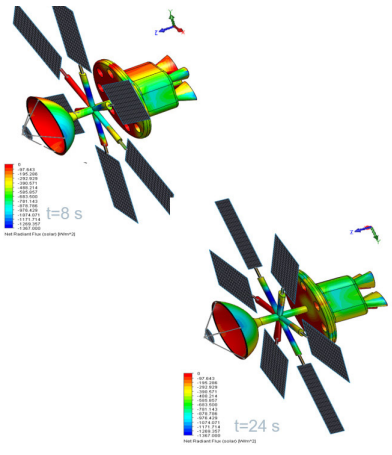
On-orbit radiation environments
For spacecraft simulations, the main sources of environmental heating are direct sunlight and sunlight reflected by a planet or moon. Simcenter FLOEFD can be used to model on-orbit radiation environments for the planets of our solar system (including Pluto) and earth's moon. It can also be used to model user-defined celestial bodies as well as the spacecraft's orbital parameters around the selected body.







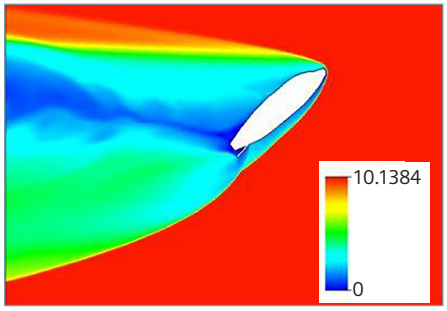




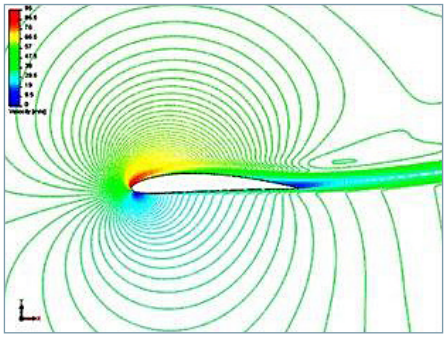
Hypersonic analysis
The hypersonic function enables Simcenter FLOEFD to simulate the flow of air at hypersonic speeds with the corresponding effects:

- Flow of air at Mach numbers of greater than 5 and less than 30
- High-temperature air dissociation and ionization
- Thin shock layer and viscous interaction

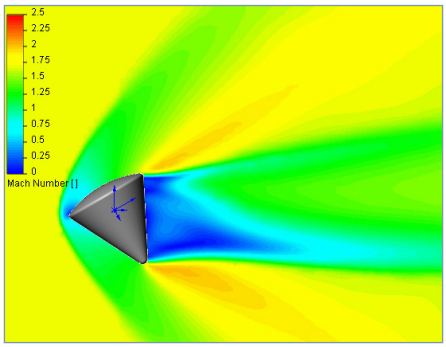
Film condensation and water sorption
In simulation cases in which water film condensation and icing or the corresponding de-icing and evaporation is required, the Simcenter FLOEFD Advanced module offers the film condensation model that considers such effects based on the environmental conditions. For special cases, even the sorption and desorption of the water film into the solid might be required to achieve highly accurate simulation results.



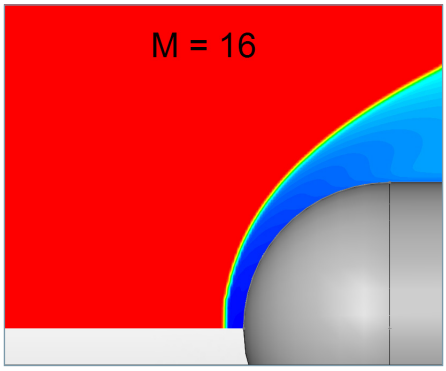
Mach number
Min=0 Max=10.1384



Subsonic



Supersonic



Hypersonic

Siemens Digital Industries Software
siemens.com/software

Americas +1 314 264 8499
Europe +44 (0) 1276 413200
Asia-Pacific +852 2230 3333

© Siemens 2019. A list of relevant Siemens trademarks can be found here. Other trademarks belong to their respective owners.
78302-C5 9/19 M