

DIGITAL INDUSTRIES SOFTWARE

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 front-loading computational fluid dynamics (CFD) software. It is designed to work directly in popular computer-aided design (CAD) software so users can simulate airflow and heat transfer using 3D models without translating data or making copies. Simcenter FLOEFD is part of the Siemens Xcelerator business platform of software, hardware and services.

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 it. There are 26 fuels and five predefined oxidizers.

Mass fraction of the combustion can be visualized for:

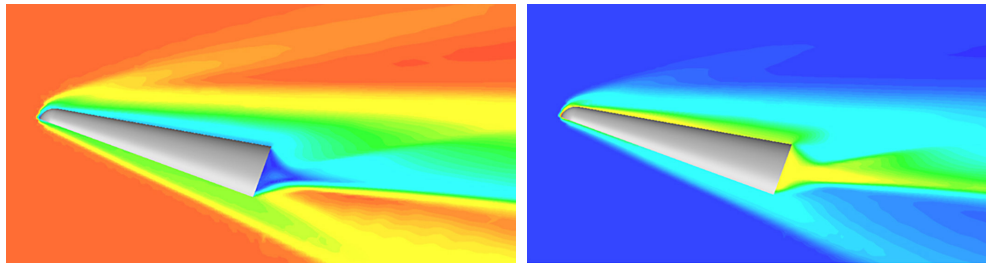
- Carbon monoxide (CO)
- Carbon dioxide (CO₂)
- Nitrogen (N₂)
- Nitric oxide (NO)
- Nitrogen dioxide (NO₂)
- Sulfur dioxide (SO₂)
- Water (H₂O)
- Residual fuel
- Residual oxidizer
- Combustion products

Radiation in combustion process

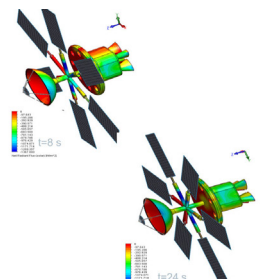
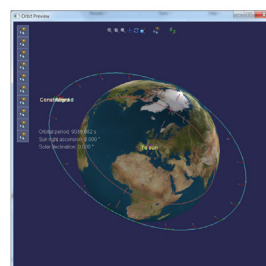
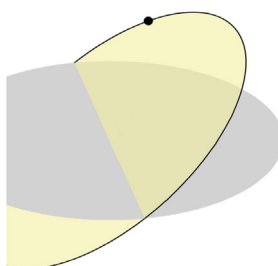
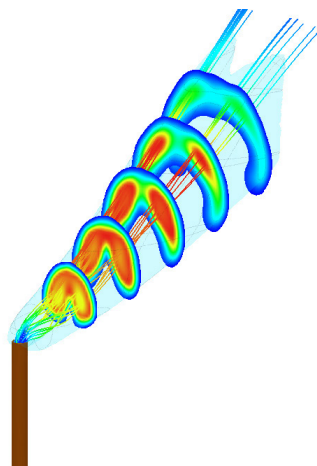
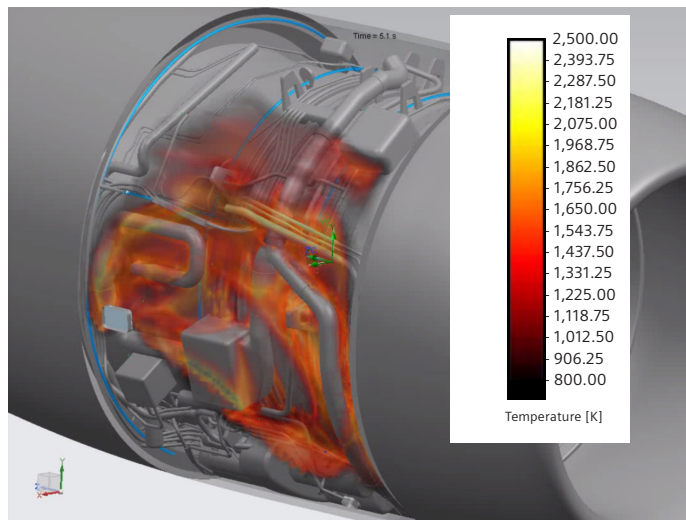
For a more accurate thermal simulation in combustion cases, the radiation of dominating radiating combustion products H₂O and CO₂ are taken into account. This option requires the discrete ordinate or Monte Carlo advanced radiation model and therefore the Simcenter FLOEFD HVAC or Simcenter FLOEFD LED module.

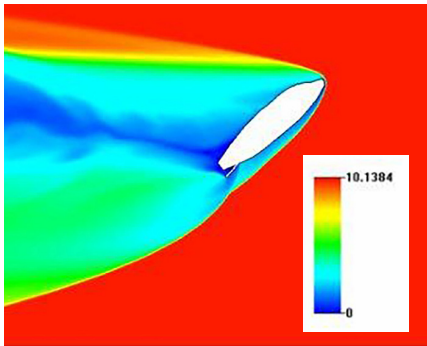
On-orbit radiation environments

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.

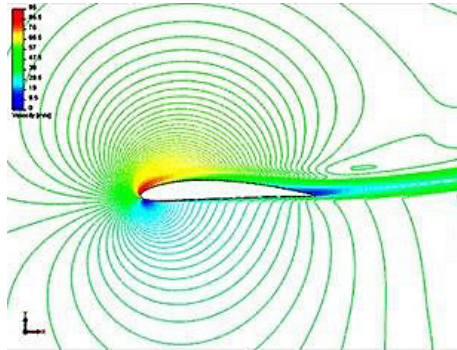


Mach 6 at an angle of attack of 20 degrees. Mach number distribution (left) and temperature field (right).





Mach number
Min=0 Max=10.1384.



Subsonic.



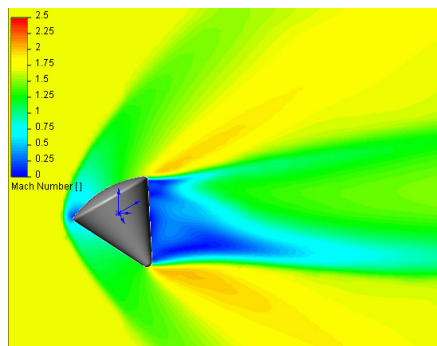
Hypersonic analysis

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

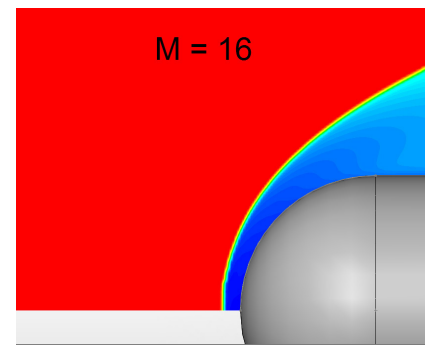
- Flow of air at Mach numbers of greater than 5 and less than 30
- High-temperature air dissociation and ionization
- Thin shock layer and viscous interaction

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.



Supersonic.



M = 16

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For additional numbers,
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