NX Advanced Flow

fact sheet

Siemens PLM Software

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Summary

NX™ Advanced Flow software is an add-on module to both NX Flow and NX Electronic Systems Cooling. The NX Advanced Flow solver provides a powerful and comprehensive solution to computational fluid dynamics (CFD) problems. Combined with NX Thermal and NX Advanced Thermal, it solves a wide range of multi-physics scenarios involving strong coupling of fluid flow and heat transfer. NX Advanced Flow simulates internal or external fluid flow including compressible and high-speed flows, non-Newtonian fluids, tracking of heavy particles, motion and multiple rotating frames of reference.

Benefits

Deliver results faster with a consistent environment that allows you to quickly move from design to advanced CFD results

Easily and rapidly create models with automatic fluid domain meshing

Rapidly iterate through design changes and what-if scenario investigations even for complex CFD analysis

Leverage the full power of NX to:

Account for aerodynamic heating

Simulate the transport and diffusion of contaminants and dust

Visualize complex turbulent phenomena

Examine multi-species mixing within the fluid domain

Account for rotational and translational motion influencing the fluid flow distribution

Optimize aerodynamic shape and component placements

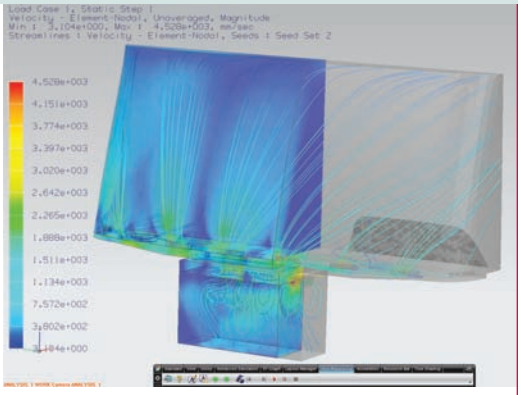
Features

Extended flow solver capabilities

Add-on results post-processing options

Fluid-Thermal multiphysics with NX Thermal and NX Advanced Thermal

Thermo-elastic interactions



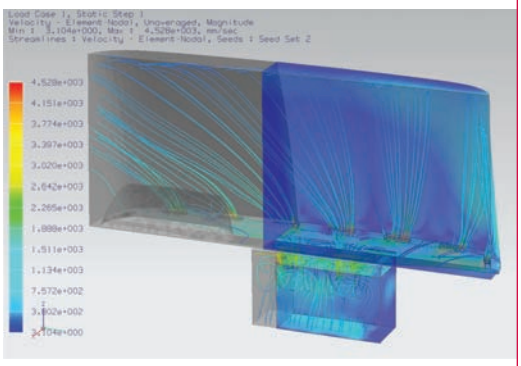
NX Advanced Flow uses computational fluid dynamics (CFD) to accurately and efficiently simulate fluid flow and convection. An element-based, finite volume CFD scheme is used to compute 3D fluid velocity, temperature and pressure by solving the Navier-Stokes equations. NX Advanced Flow technology allows users to model complex fluid flow problems. NX Advanced flow is an add-on to NX Flow and NX Electronic Systems Cooling. Applications of NX Advanced Flow include:

- Calculation of drag and lift forces
- Simulation of automotive underhood cooling
- Flow analysis for HVAC systems
- Modeling high speed compressible flows to find choking conditions or to find the location of shock waves
- Simulation of high speed rotating equipment
- Simulation of non-Newtonian fluid flow in applications with fluids such as blood and slurry.

NX Advanced Flow features

Solver capabilities

In addition to NX Flow solver capabilities, NX Advanced Flow solver capabilities include:



- Single and multiple rotating frames-of-reference
- Additional turbulence models such as SST and k-Omega
- High speed flows with supersonic inlet
- General scalars diffusion and heavy particle tracking
- Humidity and condensation algorithm

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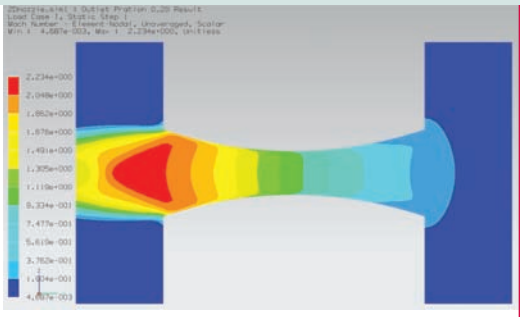


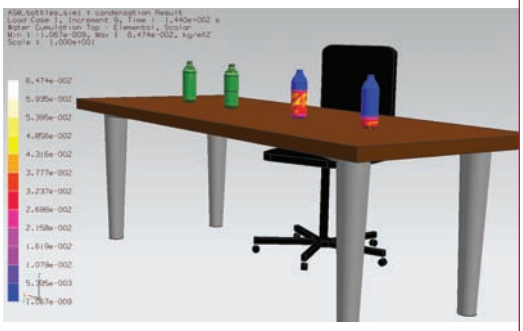
- Non-Newtonian fluid models
- Moving boundaries (statically applied translating and rotating walls)
- Translational and rotational periodicity
- CFD intermediate results recovery allowing solver restart
- 1D duct flow coupled with 3D flow
- Implicit convection correlations to ambient conditions

Add-on results post-processing options

- Mach number
- Humidity and condensation data
- Scalars distribution data
- Additional turbulence data
- Tracking of heavy particles
- PPD-Percentage People Dissatisfied (HVAC applications)
- PMV-Predicted Mean Vote (HVAC applications)
- Track and plot flow data on specific regions at run time.
- Acoustic power density result option

Fluid-thermal multiphysics

NX Advanced Flow can be seamlessly coupled to NX Thermal and NX Advanced Thermal for simulation of complex thermo-fluid interactions and conjugate heat transfer. This multi-physics coupling capability is included at no extra cost and no additional licenses are required other than the NX Flow, NX Advanced Flow, NX Thermal and optionally NX Advanced Thermal licenses. The thermo-fluid solver handles disjoint meshes at fluid/solid boundaries allowing great flexibility in assembly context thermo-fluid interactions. The fluid domain and thermal domain do not need to share nodes at the interface; the coupled solver will create the appropriate heat transfer coupling at all the solid/fluid interfaces.



Thermo-elastic interactions

Temperature, pressure and shear force results from the NX Advanced Flow solution can be used as a pre-stress condition for a structural thermo-elastic analysis. The NX Nastran® license is sold separately.

Supported hardware/OS

NX Advanced Flow is an add-on module in the NX Advanced Simulation suite of applications. It requires a license of NX Flow as a prerequisite. All standard Siemens NX hardware/OS platforms are supported (including Windows, Linux and selected 64-bit platforms). Contact Siemens for any other specific hardware/OS support requests.

Contact
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