

ANSYS CFX-Flo 10.0

General Capabilities and Models

- Solution on any mixture of tetrahedral, hexahedral, prism and/or pyramid elements
- Incompressible / compressible - subsonic, transonic, supersonic
- Steady state / transient
- Laminar / turbulent
- Rotating or stationary frame of reference
 - Alternate Rotation Model to minimize false swirl in rotating components
- Turbulence models
 - Zero-equation turbulence
 - k- ϵ , RNG k- ϵ , k- ω
 - Shear Stress Transport
 - k- ω Reynolds Stress
 - Scalable wall functions
 - Automatic near-wall treatment including integration to the wall
- Heat transfer
 - None, isothermal, thermal energy or total energy
 - Viscous heating
 - Conjugate heat transfer
 - Natural convection
 - Radiation
 - Discrete Transfer Radiation model
 - P1 (Diffuse) radiation model
 - Rosseland radiation model
- Newtonian and non-Newtonian fluids
- User-defined equations and species transport
 - Advective/Diffusive transport
 - Poisson Equation
 - Scalar and Vector Algebraic Additional Variables
 - Flexible Properties
 - Ideal Gas Equation of State
 - Redlich Kwong Equation of State
 - User defined properties through Expressions or User Fortran
 - Antoine equation for vapor pressure curves of pure substances.
 - Kinetic theory viscosity and thermal conductivity models including Sutherlands Law, Modified Eucken and Non Interacting sphere models
 - Equilibrium real gas thermodynamics
 - Real gas properties can be provided via tables or expressions for equation of state and Cp definition
- Wetness Model
- Tables for steam and R134a provided
- Multi-component fluids
- Algebraic Slip Multiphase Model
- Free Surface modeling
 - Compressive discretization for sharp free surface interfaces
 - Surface tension
- Rayleigh Plesset Cavitation Model
- Noise modeling : Export of Surface and Rotating dipole sources for acoustics solvers
- Volumetric porosity with sharp interface capture
- Linear and quadratic resistance models
- User-defined volumetric sources of mass, momentum, energy and species
- User-defined boundary sources of mass, momentum, energy and species
- Solution-based mesh adaptation

Fluid/Structure Interaction

- Transfer of force and thermal results to ANSYS stress analysis

Numerics

- Conservative finite-element based control volume method
- Implicit, pressure-based algorithm for all flow speeds, incompressible to compressible
- Advection modeling
 - High Resolution bounded discretization
 - Upwind differencing scheme
 - 1st-2nd order blend factor
- First and Second Order transient discretization with Adaptive Transient Time-stepping

CFD Mesh Capabilities

- Automated mesh update with geometry updates
- Tetra and prism volume meshing
- High quality boundary layer meshing
- Body and part suppression for meshing
- Virtual topology
- Surface curvature sensitive meshing
- Automated 3-D proximity refinement
- Mesh morphing from prescribed surface or volume motion

Physics Pre-processor

- Quick Setup Wizard
- Import of meshes from a wide variety of sources / formats, including: ANSYS, ANSYS® ICEM CFD™, I-DEAS® Universal, Patran Neutral, Nastran®, CGNS and others.
- Transform and connect multiple meshes using the generalized grid interface
- Intuitive problem definition
- Flexible fluids editor, including common fluids library
- Visualization of boundary conditions
- Context sensitive on-line user documentation with hyperlinks

Boundary Conditions

- Inlet: Mass flow, velocity, static pressure, total pressure, supersonic, mixed sub/supersonic
- Outlet: Mass flow, velocity, uniform pressure, average pressure, supersonic, meridional pressure profile, Zero Gradient condition
- Opening (“mixed flow”): Velocity, static pressure, total/static pressure
- Wall: No slip, Slip, rough, moving, adiabatic, temperature specified, heat flux, heat transfer coefficient
- Symmetry, Periodic Pair, Thin surfaces
- 1-D or 2-D Profile specifications for any quantity

Post-processing

The ANSYS® CFX® -Post™ post-processor provides a powerful and flexible analysis system for ANSYS CFX results. Its capabilities are summarized below.

- Reads results in ANSYS CFX or CGNS formats
- Data comparison over multiple results

- Regions
 - Points
 - Slice planes (unbounded and bounded)
 - Uniform point sampling
 - Circular and rectangular sample planes
 - Isosurfaces
 - Surface or Revolution
 - Boundaries
 - Volumes from Iso-values, sphere, surface intersection.
 - Lines and polylines (2-point, external data or boundary/slice intersection)
 - Surface groups
 - Offset surfaces
 - User surfaces from external data
- Plots (on any region)
 - Coloring by variables
 - Contours/fringes
 - Streaklines & Surface Streaklines
 - Vectors
 - XY graphs
 - Rendering control of faces, lines, lighting, transparency and texture mapping
- Annotations
 - Legends
 - 2-D and 3-D text labels
- Animation
 - Quick animation of key graphics objects
 - Detailed key-frame animation
 - Automated MPEG creation
- Quantitative calculations
 - Node count, mass flow, length, area and volume evaluation
 - Length, area, volume and mass flow-based averaging and integration
 - Force and torque calculation
 - Support of all above functions in expressions
 - Expression evaluation
 - User defined variables
 - Configurable Units specification
 - Data Export
 - Quantitative Tables in a spreadsheet-like environment

User Interface

- Session recording and playback
- State save and restore
- Batch processing
- Unlimited undo and redo
- Automatic region recalculation after reload
 - Context sensitive help
- Object picking and dynamic highlighting
- Detailed object control with context-sensitive viewer interaction
- Interactive Data Probe
- Interactive point picking for plane and point regions
- Multiple viewer windows
- Predefined and user defined views
- Scene clipping
- Image output to postscript, jpeg, png, bmp, ppm and vrml

Platform support

- Hewlett-Packard® PA-8000
- SUN UltraSparc™ running Solaris™ 8 or 9
- Personal computers running Windows® 2000, Windows® XP or Red Hat®/SuSE™ Linux®.
- Opteron® & EM64T processors

Licensing

CFX-Flo includes CFX®-Mesh™, CFX®-Pre™, CFX Basic Solver Capability and CFX-Post using a configured task license approach.