

# FLOW-3D® Cast Version 3.1.1 Features

## Meshing & Geometry

- \* Structured finite difference/control volume
- \* Multi-Block Gridding with
  - \* Nested blocks
  - \* Linked blocks
- \* Fractional areas/volumes (FAVOR™) for efficient & accurate geometry
- \* Solids Modeler
- \* STL-files (geometry) import

## Flow Type Options

- \* Three & two dimensional problems
- \* Non-inertial reference frames
- \* Multiple scalar species
- \* Heat transfer with phase change
- \* Saturated & unsaturated porous media

## Flow Definition Options

- \* General initial conditions
- \* Boundary condition
  - \* Symmetry,
  - \* Rigid walls,
  - \* Specified pressure,
  - \* Specified velocity,
- \* Restart options
  - \* Restart previous simulation
  - \* Overlay boundary conditions from a previous simulation
  - \* Change mesh
  - \* Add, delete or change model parameters

## Numerical Modeling Options

- \* Volume-of-Fluid (VOF) method for fluid interfaces-TruVOF
- \* First, Second and Third order advection
- \* Sharp fluid interface tracking
- \* Implicit & explicit modeling options
- \* Point relaxation & GMRES pressure solver solvers

## Thermal Modeling Options

- \* Natural convection
- \* Forced convection
- \* Conduction in fluid & solid
- \* Fluid-solid heat transfer
- \* Specified heat flux
- \* Specified solid temperature
- \* Heat transfer to voids from fluid/obstacle
- \* Distributes energy sources/sinks in fluids or solids
- \* Radiation by emissivity
- \* Viscous heating

## Physical Modeling Options

- \* Cavitation
- \* Phase change
- \* Surface tension
- \* Thermocapillary effects
- \* Wall adhesion
- \* Wall roughness
- \* Vapor & gas bubbles
- \* Solidification & melting (heat-of-transformation table)
- \* Mass/energy sources
- \* Shear, density & temperature-dependent viscosity
- \* Thixotropic viscosity
- \* Elastic stress
- \* Air entrainment
- \* Molecular & Turbulent Diffusion
- \* Adiabatic bubbles

## Metal Casting Models

- \* Solidification & melting
- \* Solidification & shrinkage
- \* Microporosity
- \* Solid fraction dependent latent heat release
- \* Thermal die cycling
- \* Thermal stress & deformations
- \* Defect tracking
- \* Cavitation potential model
- \* Lost foam casting model
- \* Semi solid material model
- \* Moisture in sand & molds
- \* Back pressure & vents
- \* Shot sleeves

## Turbulence Models

- \* Two-equation  $\kappa$ - $\epsilon$  model
- \* RNG  $\kappa$ - $\epsilon$  model

## Porous Media Models

- \* General flow losses (linear & quadratic) natural convection
- \* Capillary pressure
- \* Unsaturated flow
- \* Heat transfer in porous media

## Special Physical Models

- \* General moving objects
- \* Porous baffles & obstacles with linear or quadratic flow losses

## Automatic Features

- \* Time-step control for accuracy & stability
- \* Automatic limited compressibility
- \* Convergence control

## Data Processing Options

- \* Interactive OpenGL-based graphics
- \* Color or B/W vector, contour, 3D surface
- \* Animation output
- \* PostScript, JPEG, PNG output
- \* Neutral file output

## Supported Platforms

### Processors

x86/x86-32  
x64/x86-64

### Operating Systems

32-bit Windows XP & Windows Vista  
64-bit Windows Vista

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