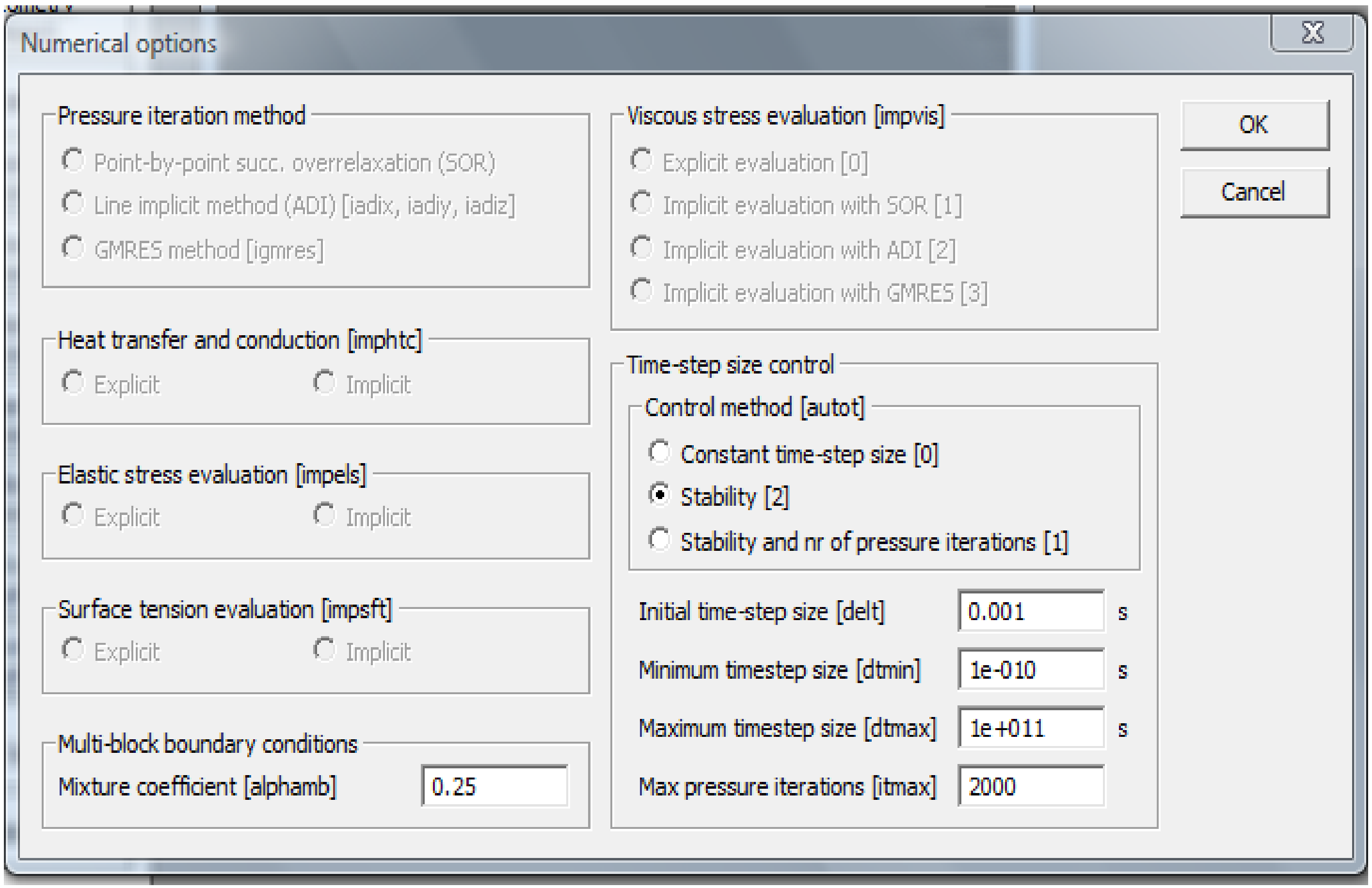
Conifer Cast 2.5

New Features:

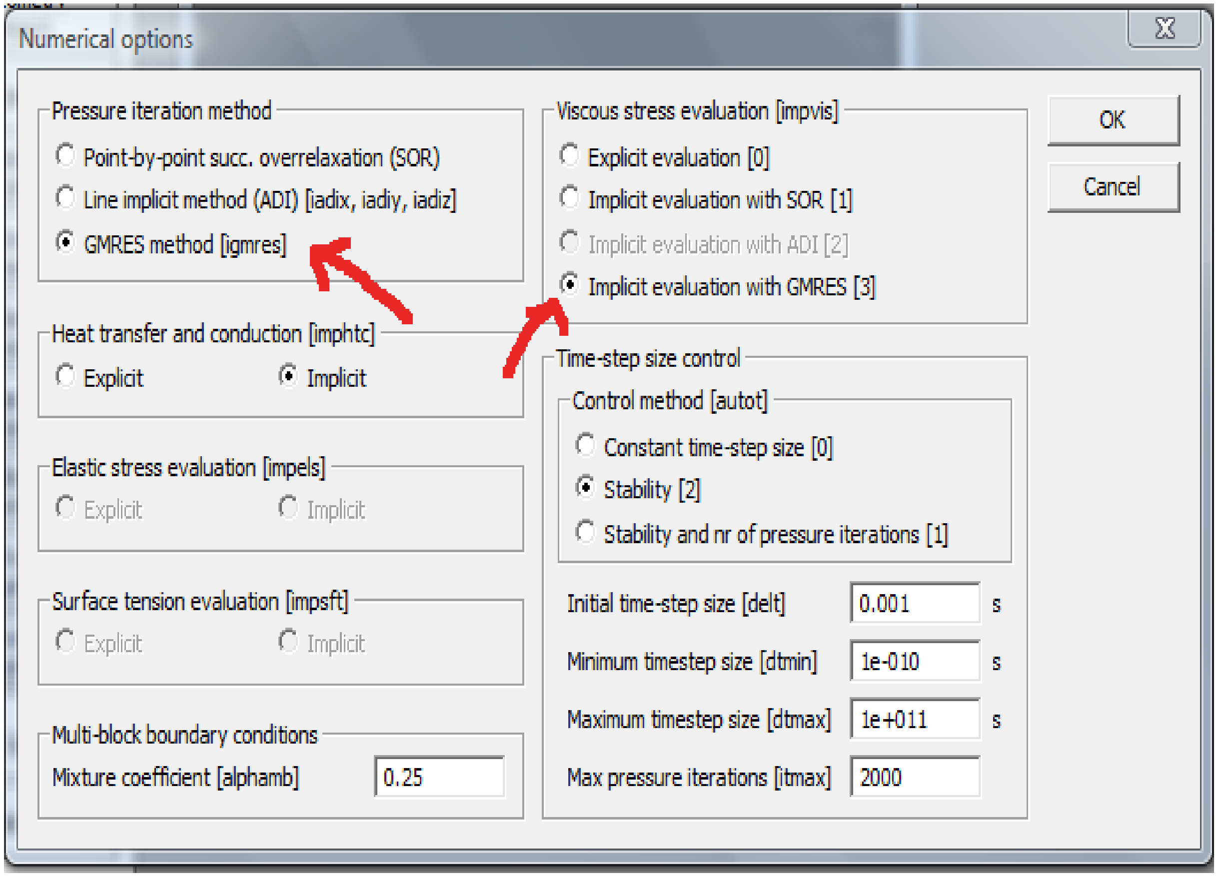
- Numerical Options
- GMRES Iteration Option for Pressure-Velocity Coupling
- Tilt Pour Casting
- Custom Flow-3D Parameters
- Three Heat Transfer Void Types
- Baffle Setup
- Moving Obstacle Setup
- The Thermoelastic Stress Model
- Implicit Surface Tension
- Air Entrainment Model

Numeric Options



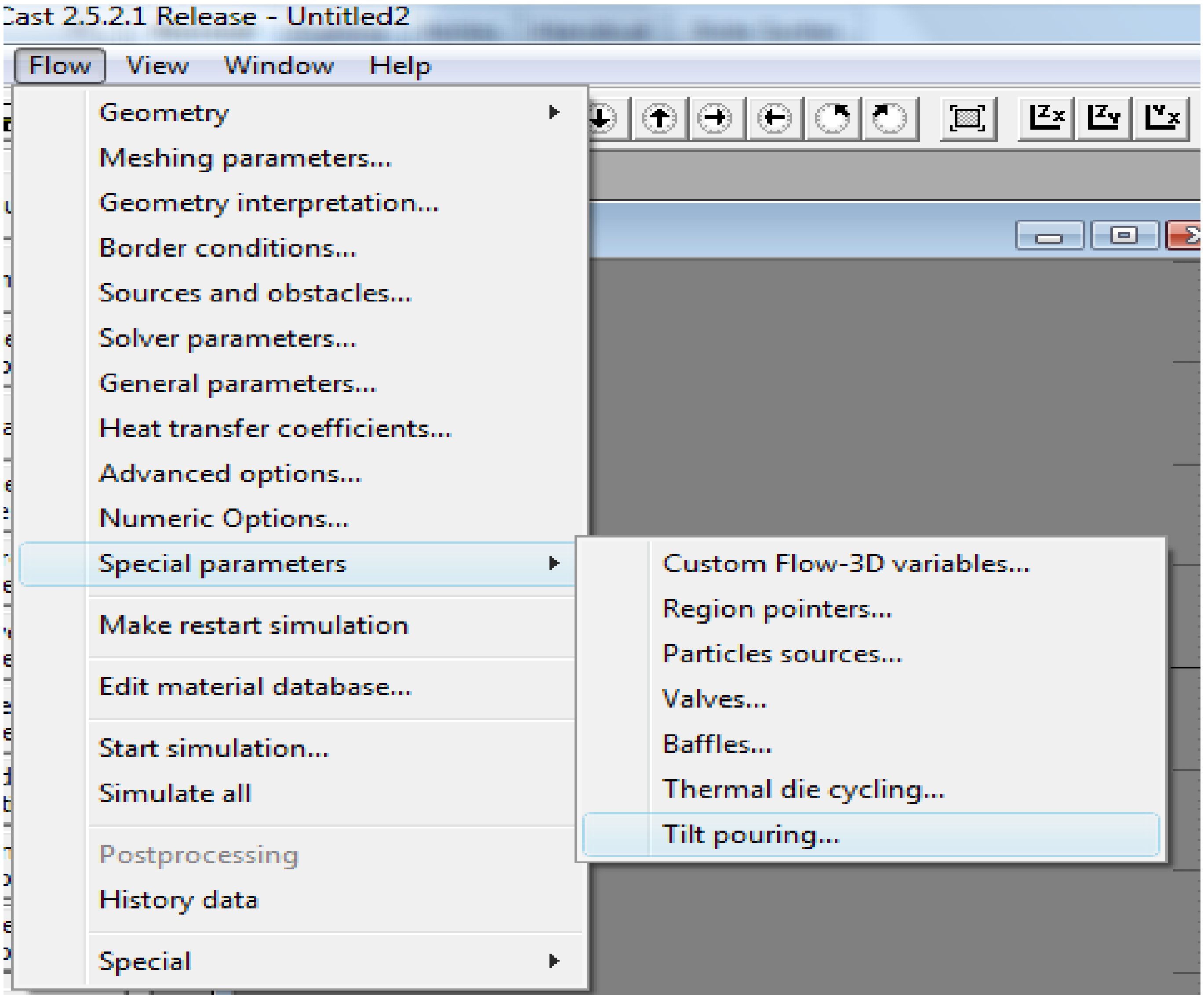
- A new dialog 'Numerical options' have been introduced.
- Numerical options contains options that control the technical details of the solver behavior.

GMRES Iteration Option



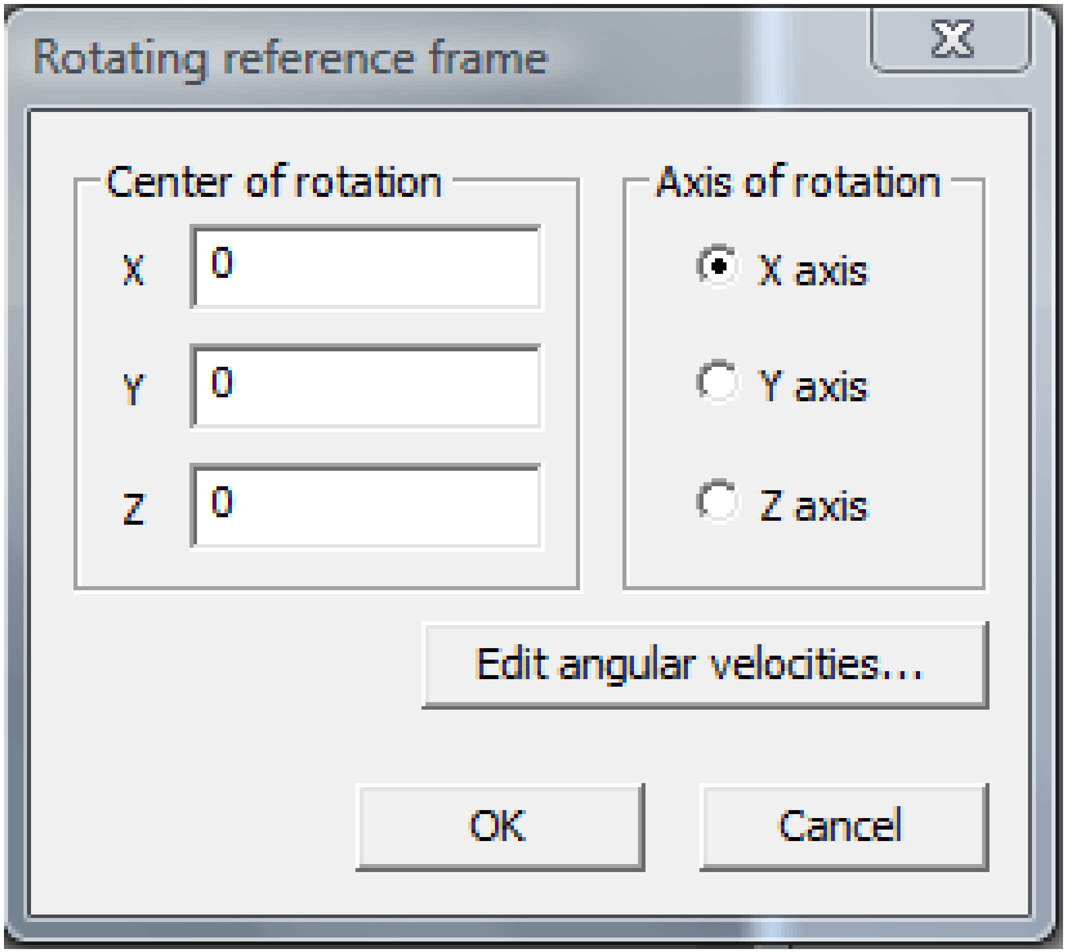
- New solver iteration method GMRES has been introduced.
- This method is the generic minimum residual method (GMRES), which is a generalization of the conjugate gradient method for non-symmetric problems. '
- The GMRES method can also be used for viscous stress evaluation, but only if it is used for pressure-velocity coupling.

Tilt Pour Casting 1/2



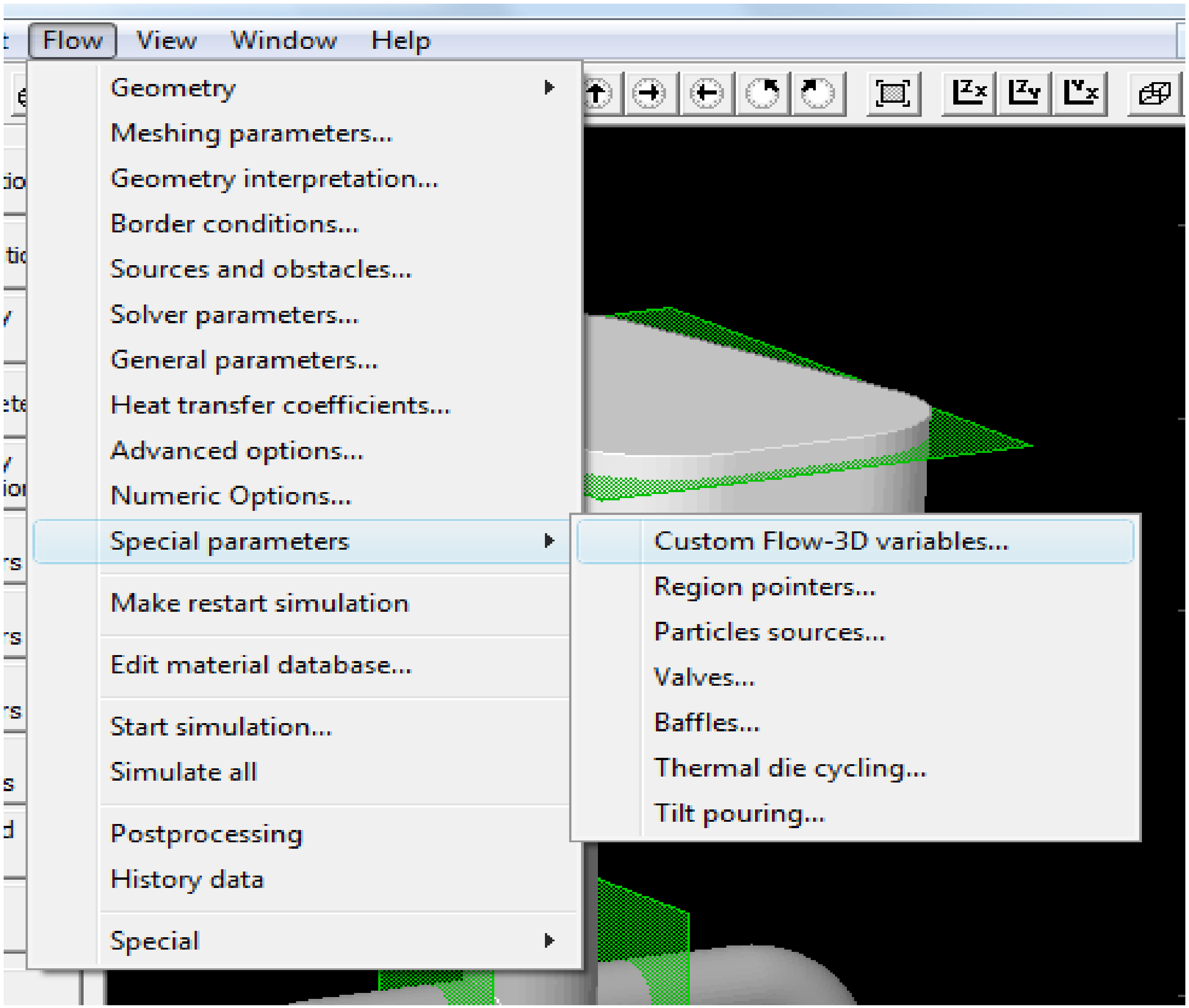
- A new feature for specifying non-inertial reference frames.
- This is used for simulating tilting casting system. The whole simulation domain is rotated according to given timetable
- Effects on
  - fluid inertia
  - gravity direction

Tilt Pour Casting 2/2



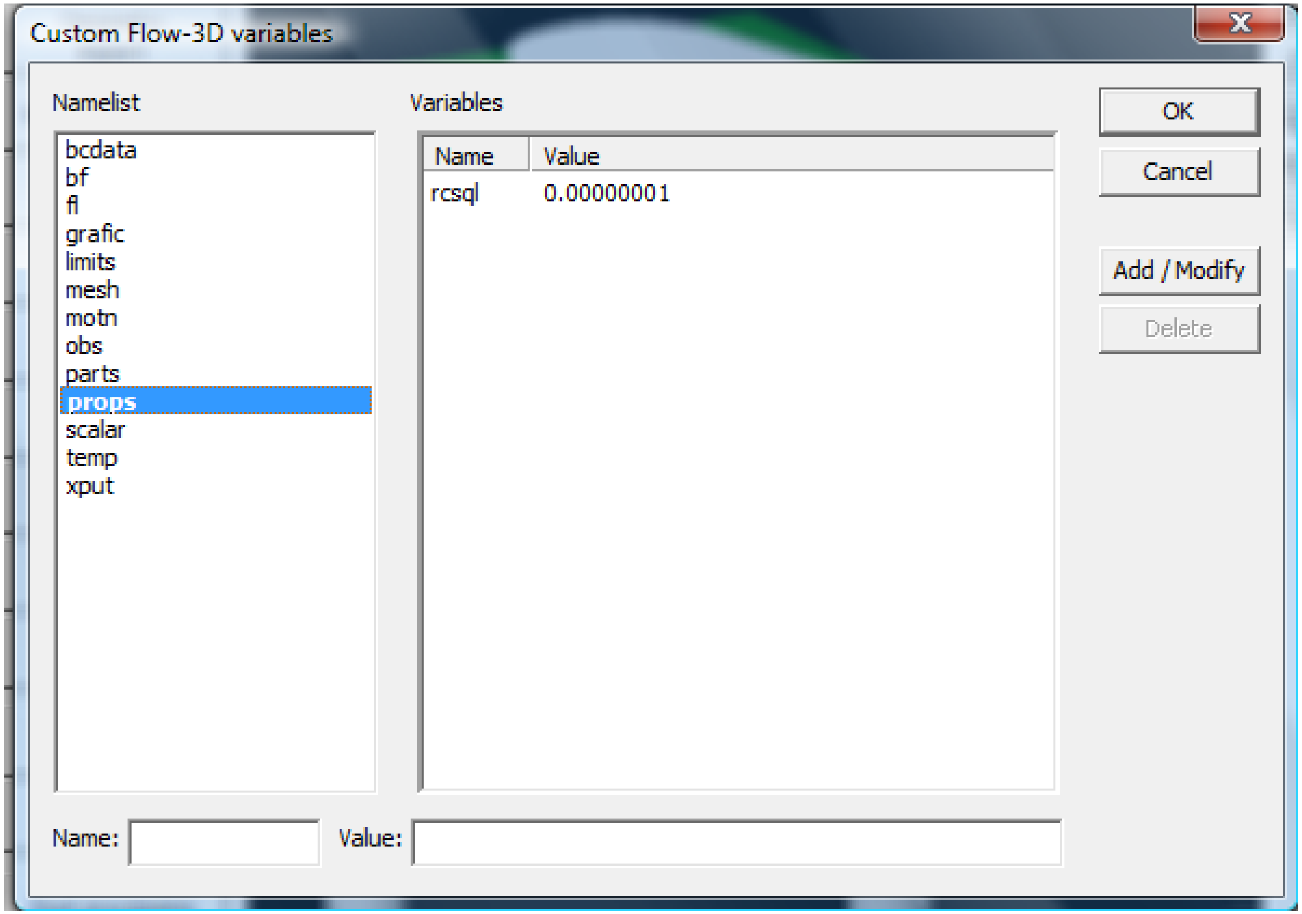
- Definition
  - The user interface allows the user to enter the following values:
    - Center of rotation (x, y and z)
    - Axis of rotation (x, y or z)
    - A table of angular velocities indexed by time (velocities in degress / second)
- In postprocessing the view is rotated according to given angle values

Custom Flow-3D Parameters 1/2



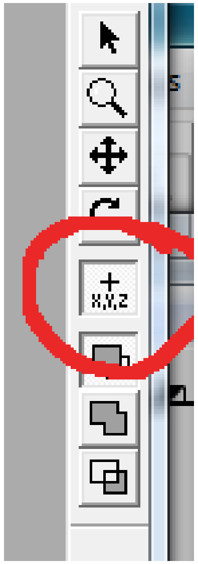
- A new feature for declaring Flow-3D input variables that are otherwise unsupported by Conifer Cast has been implemented.

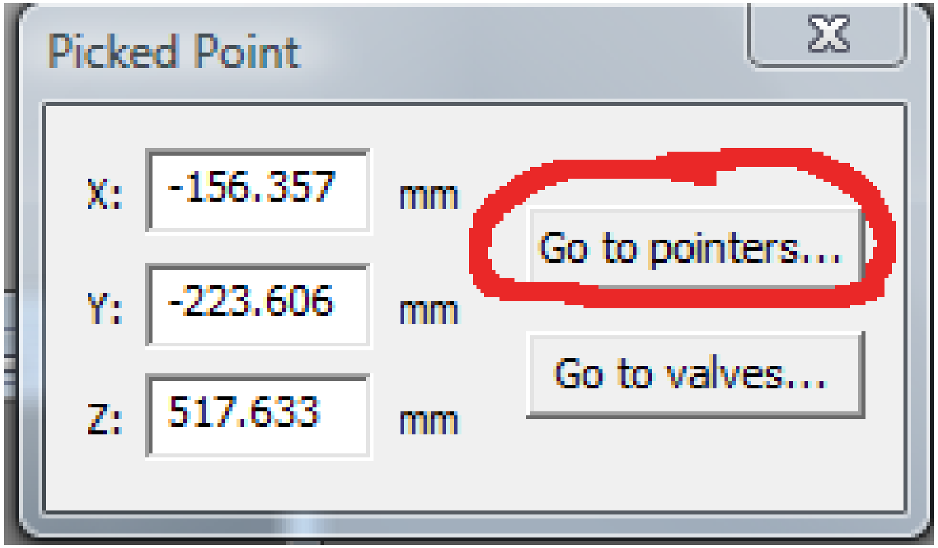
Custom Flow-3D Parameters 2/2



- Left hand side contains a list of namelists as defined in the FLOW-3D prepin.inp specification
- Rght hand side contains a list of defined varibles and their current values.
- The bottom of the dialog has fields for entering the variable name and its value.
- The values defined here are appended as they are to the prepin.inp file from where the solver reads the simulation problem definition
- Values given here have precedence over any values written by the Conifer Cast user interface

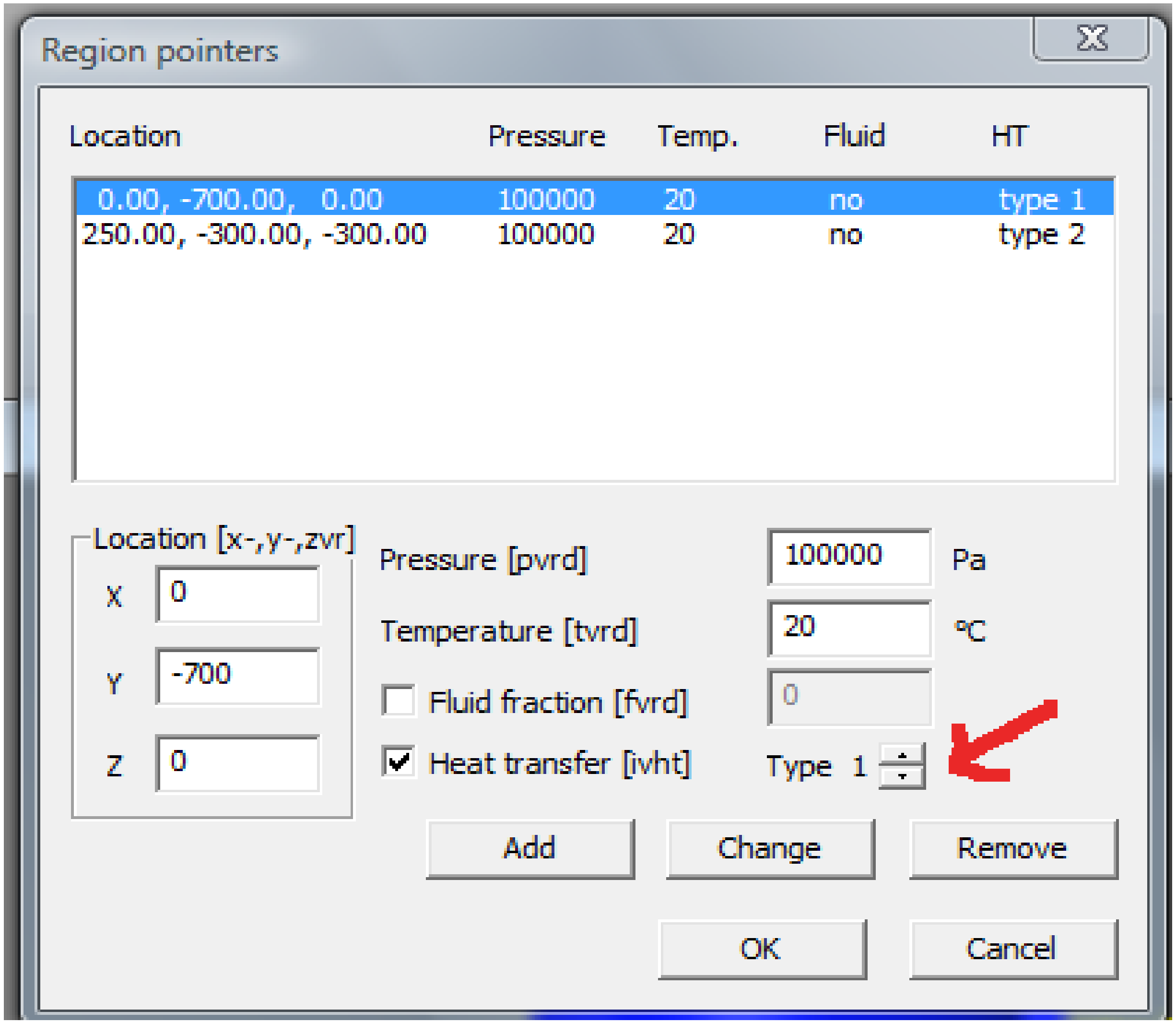
Three Heat Transfer Void Types 1/3





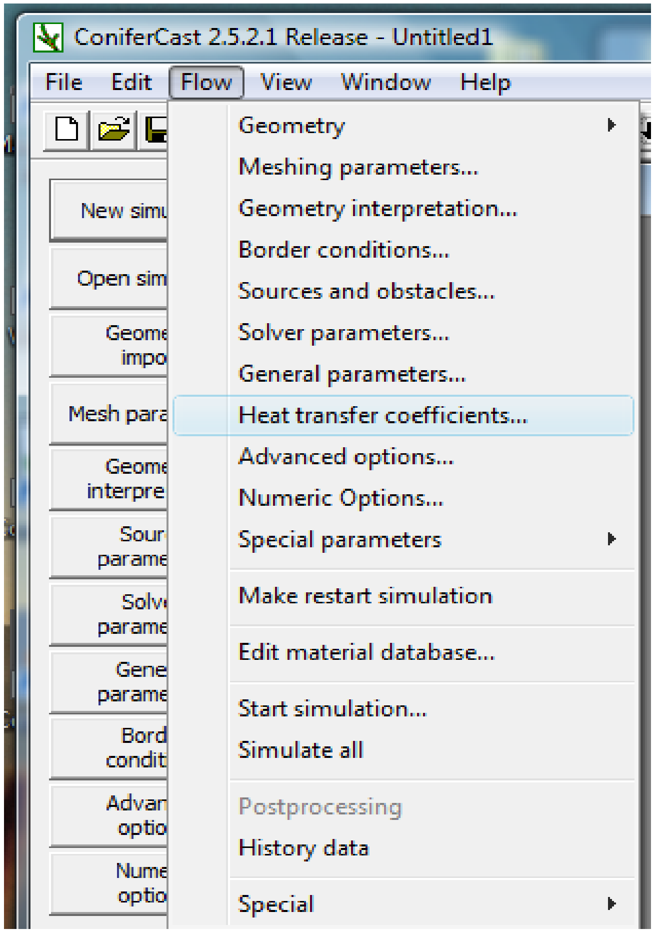
- There is a possibility in Flow-3D to declare three different types of heat transfer voids.
- Void regions are typically used for modeling gas regions
- Void region type is defined with pointers
  - Select 'Pick point' feature from the toolbar
  - Click on a location on screen
  - 'Picked Point' dialog will appear with the coordinates of the picked point
  - Click 'Go to pointers...' to define the void type for the cavity in the picked location

Three Heat Transfer Void Types 2/3

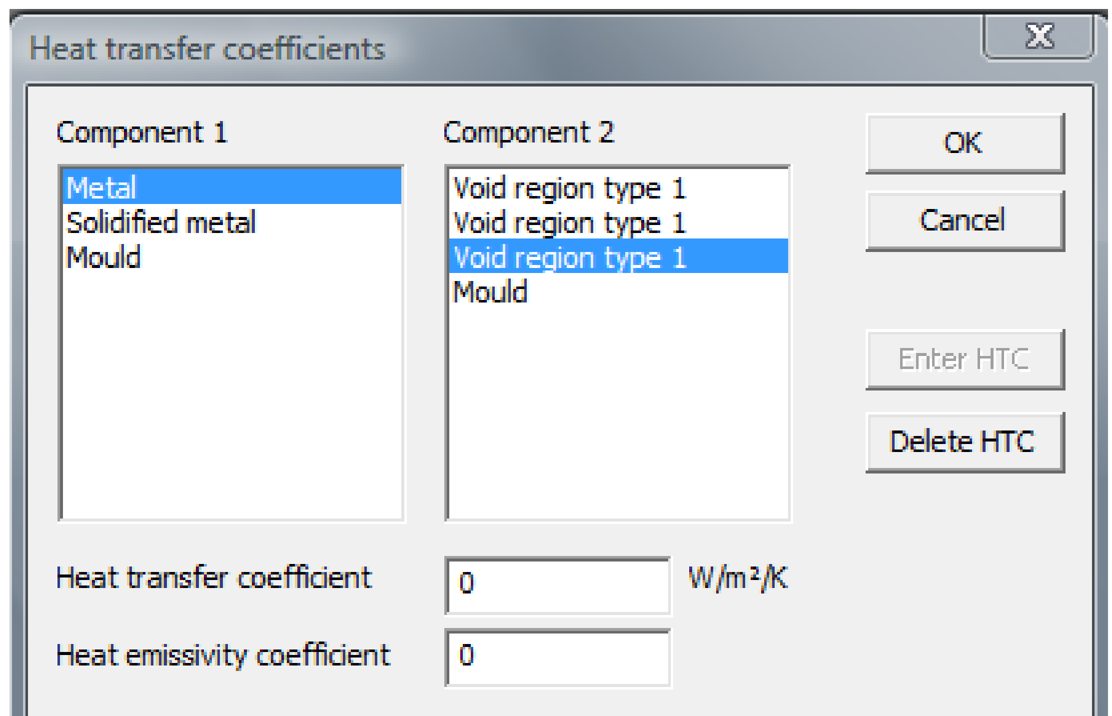


- For each of these three void types a separate temperature and pressure s can be given.

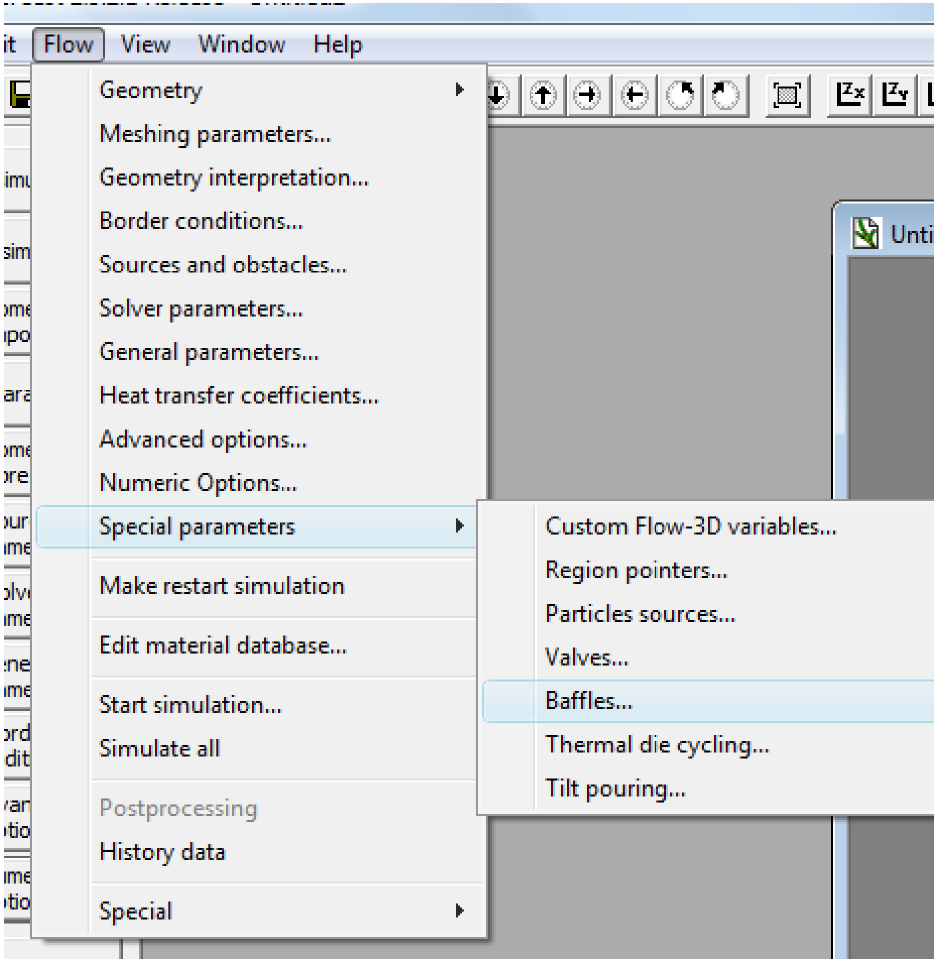
Three Heat Transfer Void Types 3/3



- Heat conductivities and heat emissivity coefficients can be given for all obstacles and the metal.

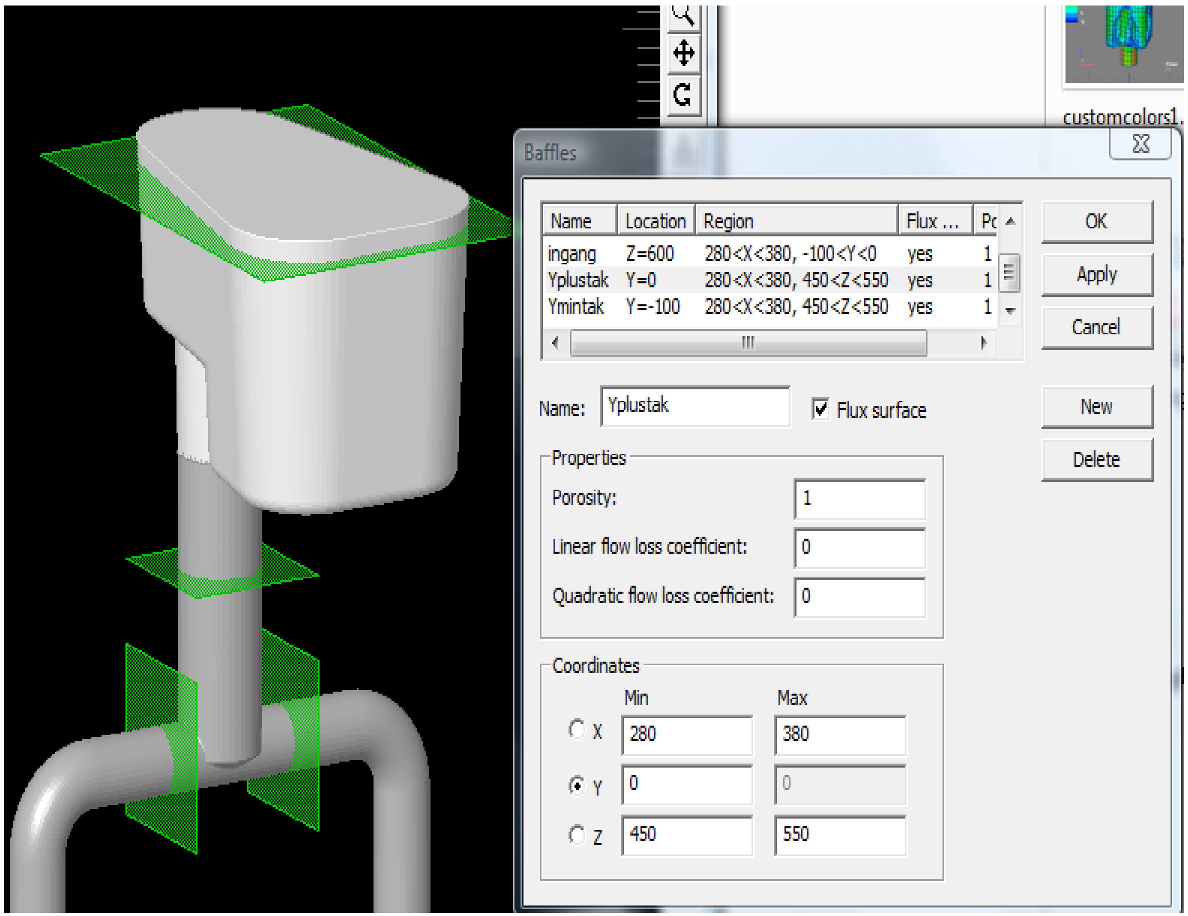


Baffles 1/2



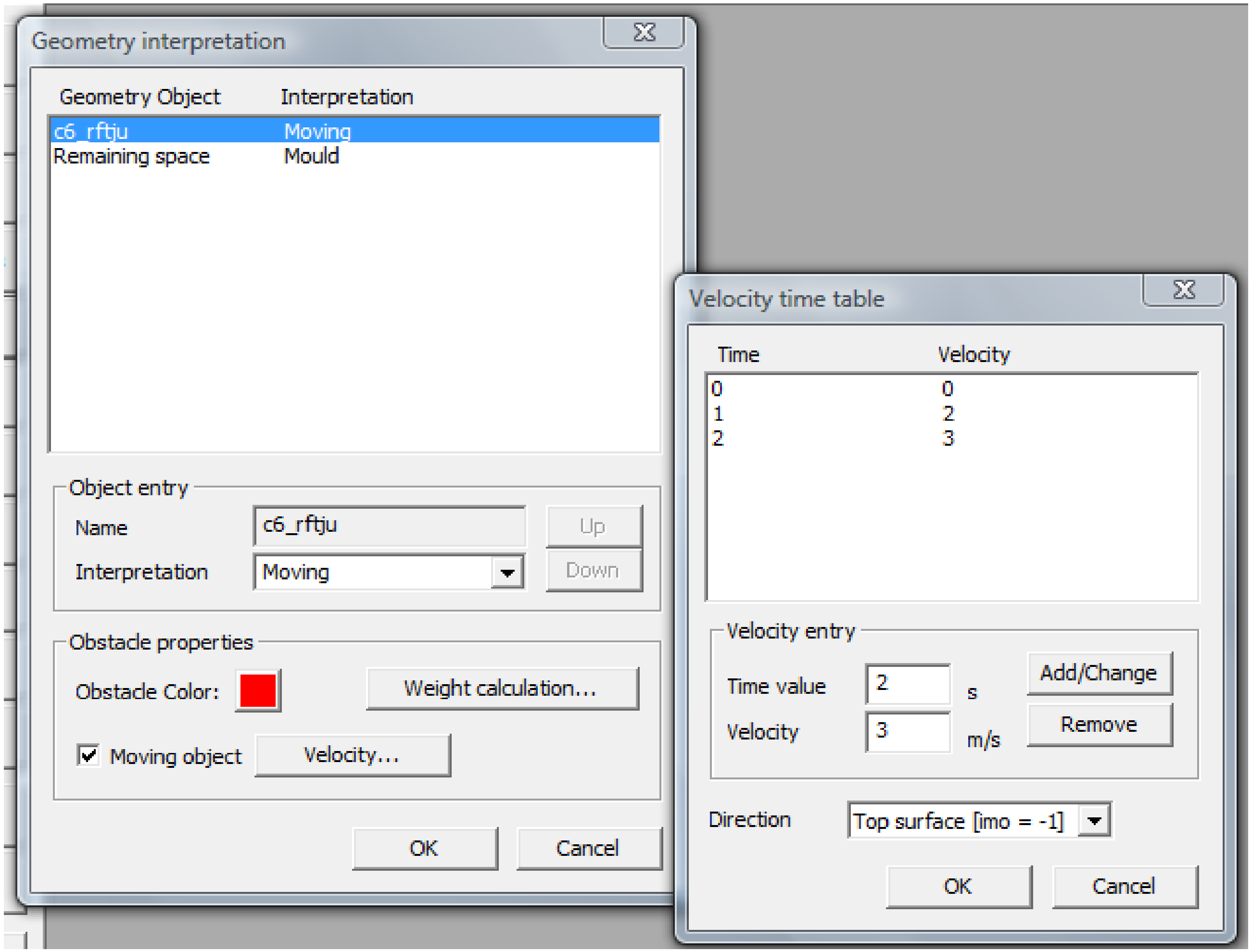
- Baffles are two dimensional elements that reside between calculation cells

Baffles 2/2



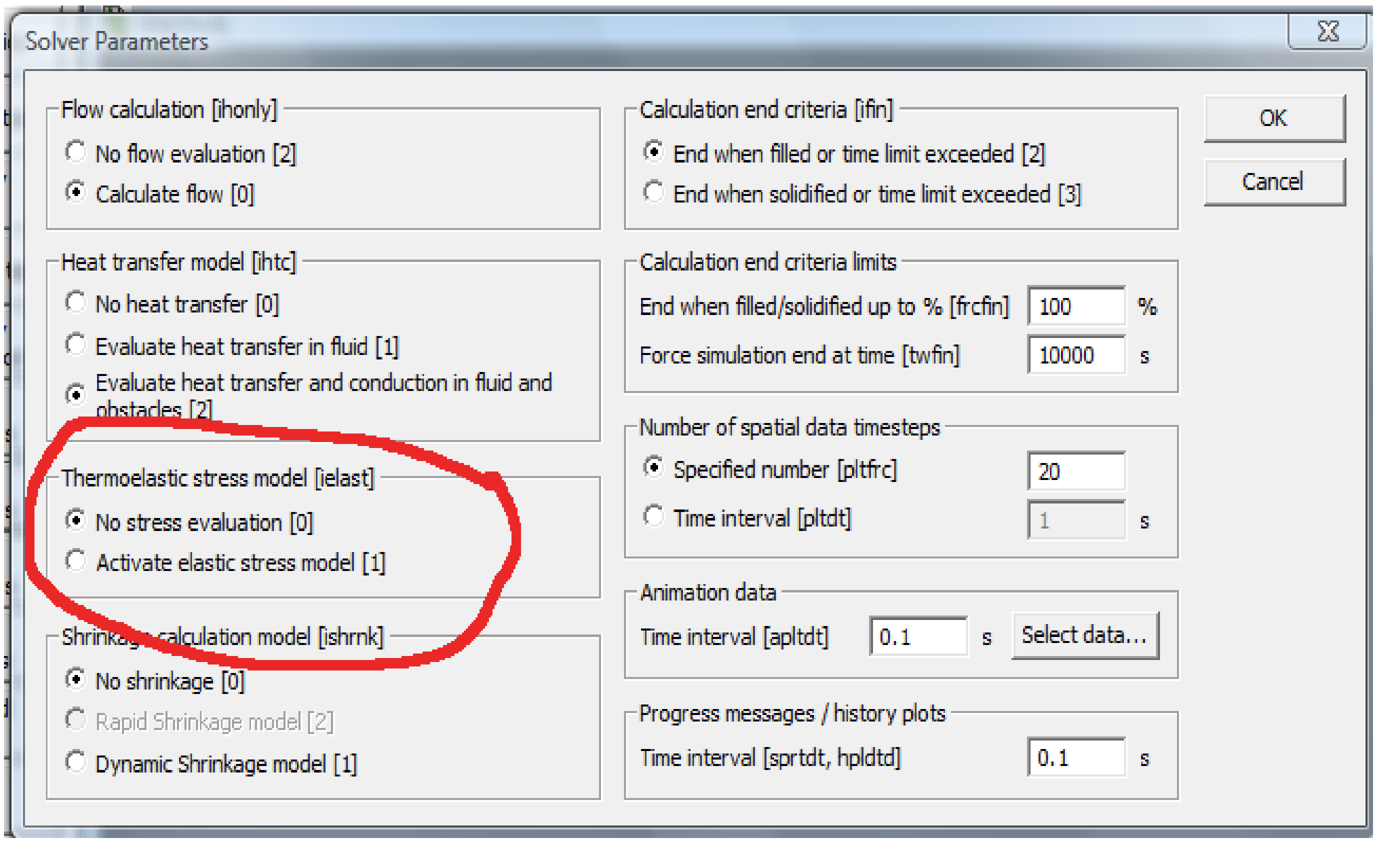
- Baffles can be used for
  - Measuring fluid flow through given location. When 'Flux surface' is enabled a history plot will be generated about the metal flow through the baffle.
  - Modeling drag effect of filters

Moving Obstacles



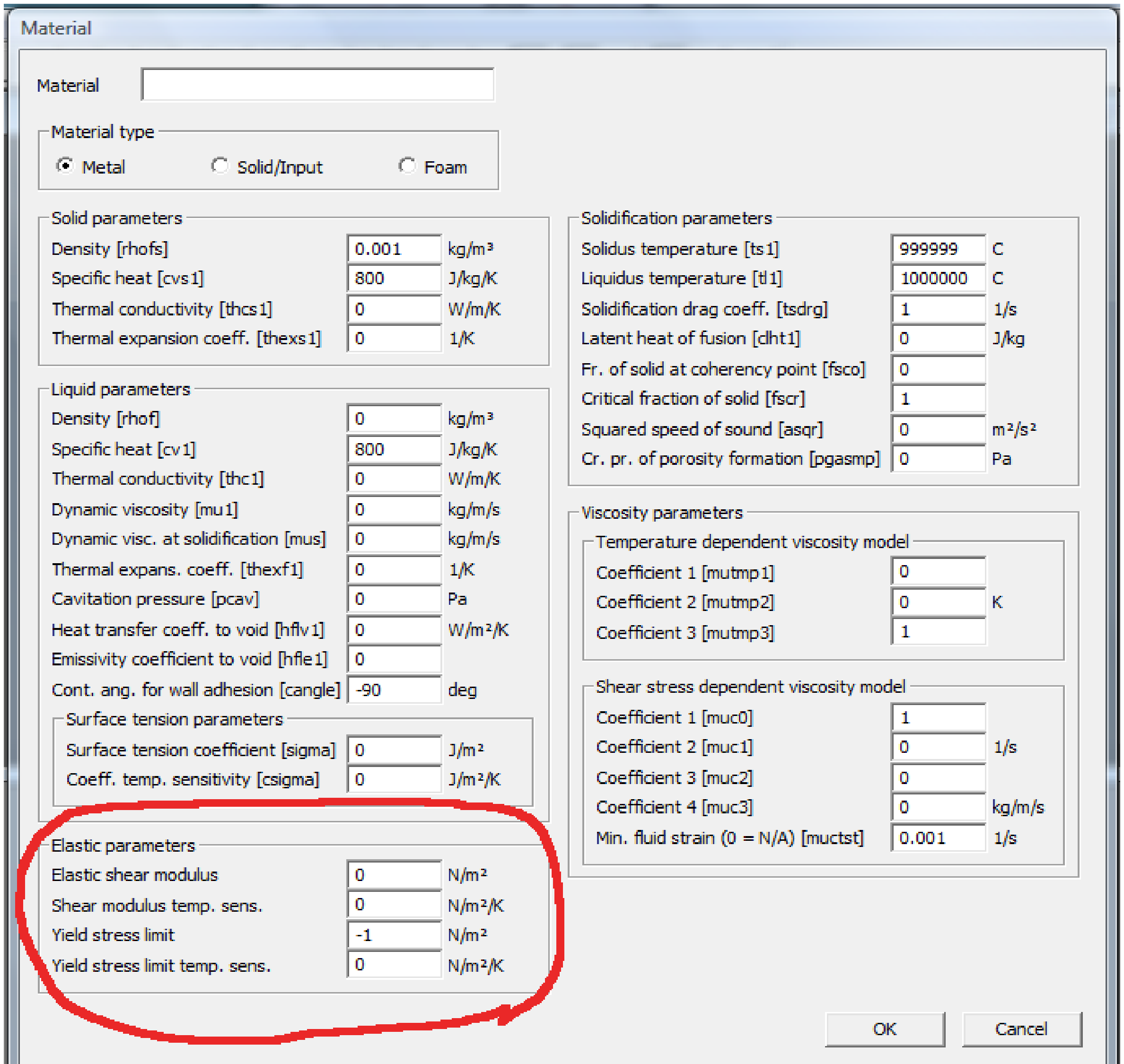
- Geometries can be defined as moving in the geometry interpretation dialog
- Object velocity is given as a function of time
- Useful for modeling pistons etc

Thermoelastic Stress Model 1/3



- Calculating Thermoelastic Stresses have been added
- Flow evaluation must be enabled for the elastic stress module
- Thermoelastic Stress model is enabled in Solver Parameter dialog

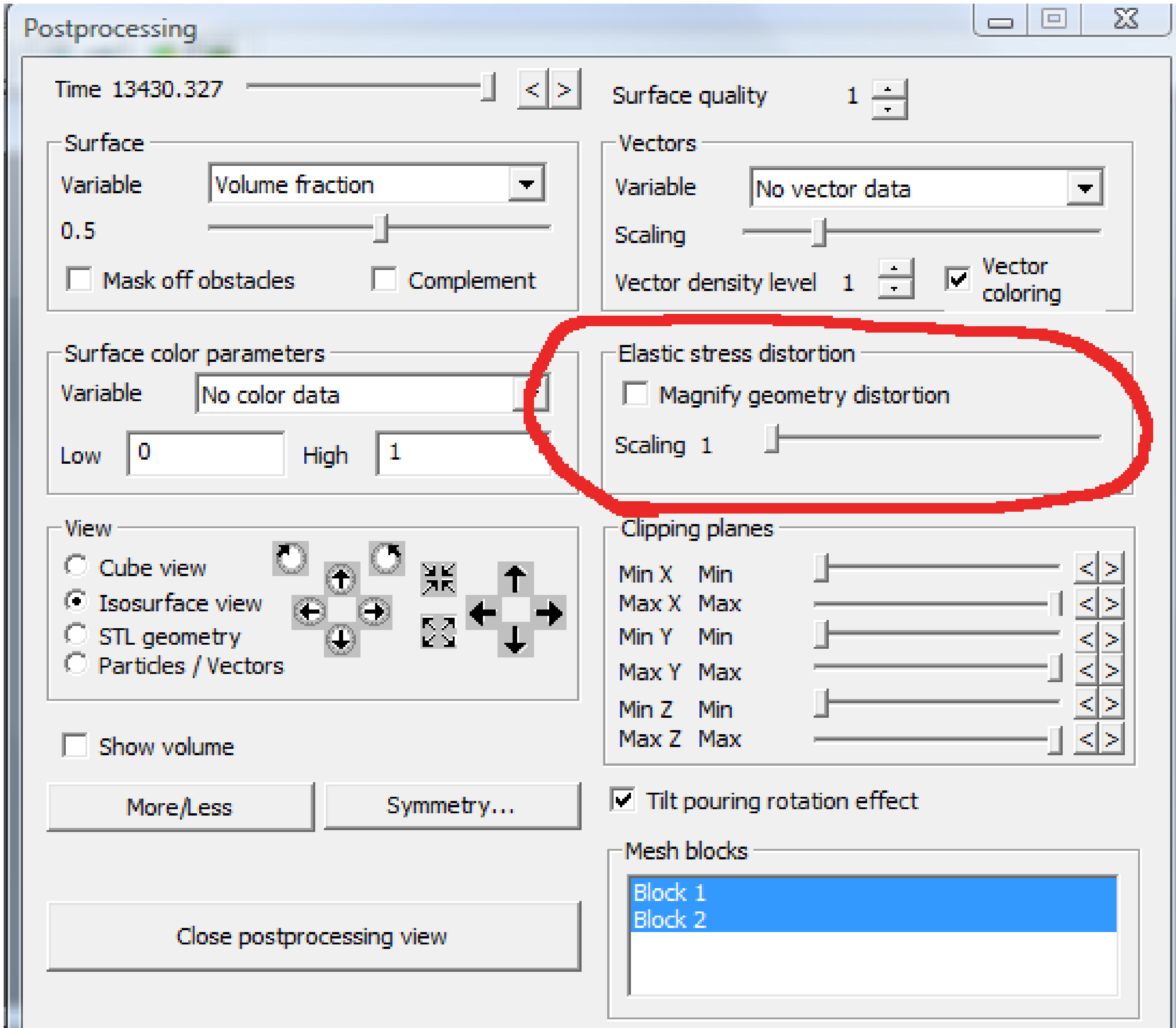
Thermoelastic Stress Model 2/3



The material parameters are as follows:

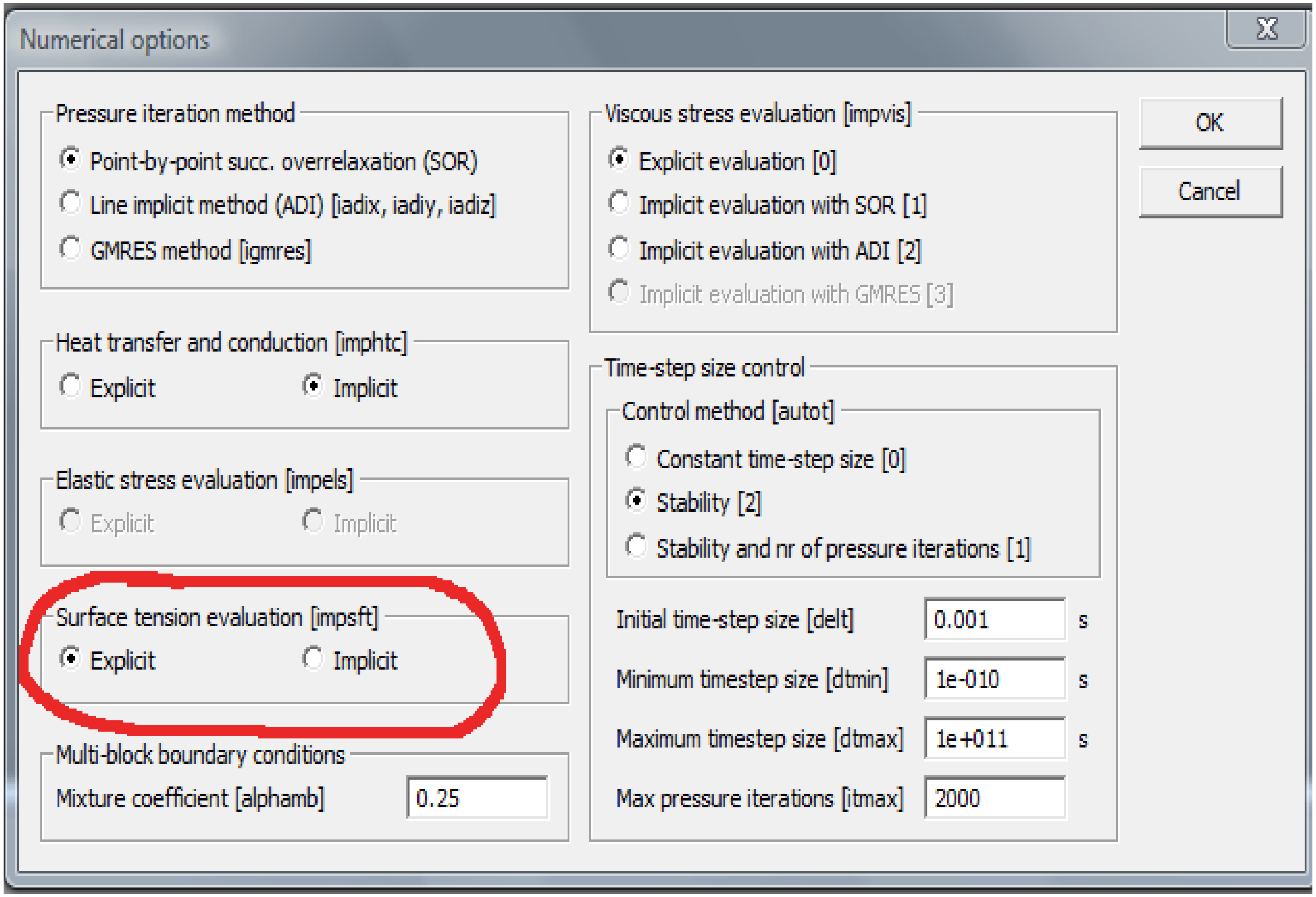
- EMOD1 / EMODT1: Shear elastic modulus. E = EMOD1 + EMOD1T * (T - TSTAR)
- YIELD1 / YIELDT1: Yield stress. Y = YIELD1 + YIELD1 * (T - TSTAR)
- THEXS1: Thermal expansion coefficient of the solid phase (alpha)

Thermoelastic Stress Model 3/3



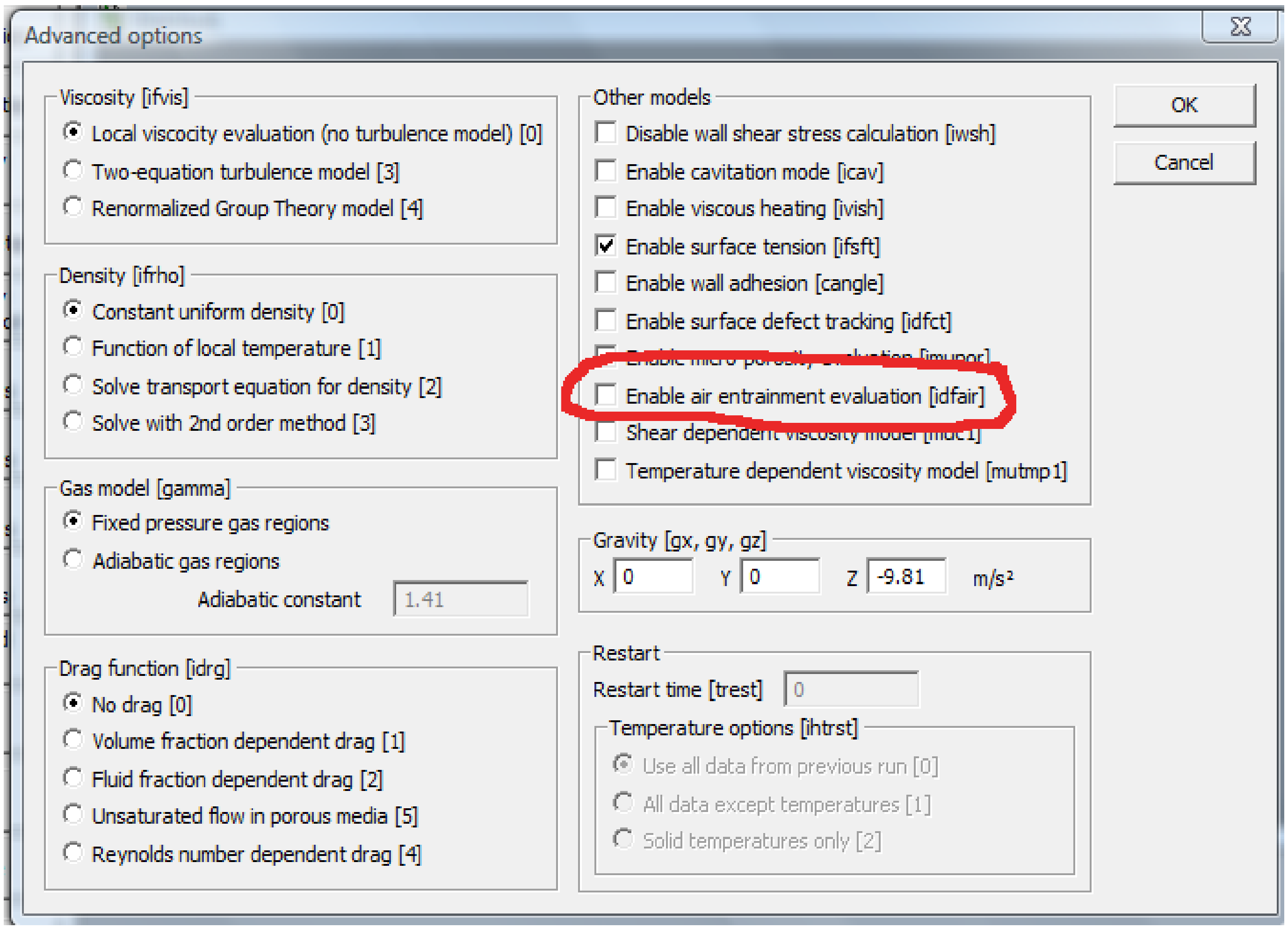
- Once thermoelastic stress is calculated the geometry distortion can be visualized in the postprocessing
- Casting piece geometry is distorted in the view according to simulation results
- In order to make the distortion more visible it can be magnified using the slider in postprocessing dialog

Implicit Surface Tension



- New implicit solution method for surface tension calculation has been added

Air Entrainment Model



- New feature of air entrainment tracking has been added