



Flownex® SE Version 8.9.0 Release Notes

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by

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1. Scope

This document contains the release notes of Flownex® Simulation Environment 8.9.0 in May 2018. Flownex® SE 8.9.0 includes major enhancements to even further improve user-friendliness and ease of use, enhanced solving capability and speed, additional features and solvers, new models and components, etc. The major and minor enhancements will be described in the release note.

2. References

2.1 APPLICABLE DOCUMENTS AND DATA

The following documents and data are applicable:

TITLE	REFERENCE NUMBER
[1] General User Manual	Flownex® SE 18.pdf
[2] Flownex® Library Theory Manual	Flownex® Theory Manual.pdf
[3] Flownex® Library Manual	Flownex® Manual.pdf
[4] Control Library Manual	DCS Library Manual.pdf
[5] Electrical Library Manual	Electrical Network Solver Manual.pdf
[6] Flownex® Demo Manual	Flownex® Demo Network Manual.pdf

2.2 APPLICABLE SOFTWARE

The following software files are applicable:

SOFTWARE DESCRIPTION	VERSION NUMBER	FILE NAME
[7] Flownex® Simulation Environment	8.9.0	<i>FNXSE 8.9.0.exe</i>

3. Enhancements

3.1 MAJOR ENHANCEMENTS

3.1.1 *Liquid Gas Mixtures*

Flownex® has expanded the fluid models to include a “liquid-gas” fluid model capable of modelling a multi-component two-phase mixture.

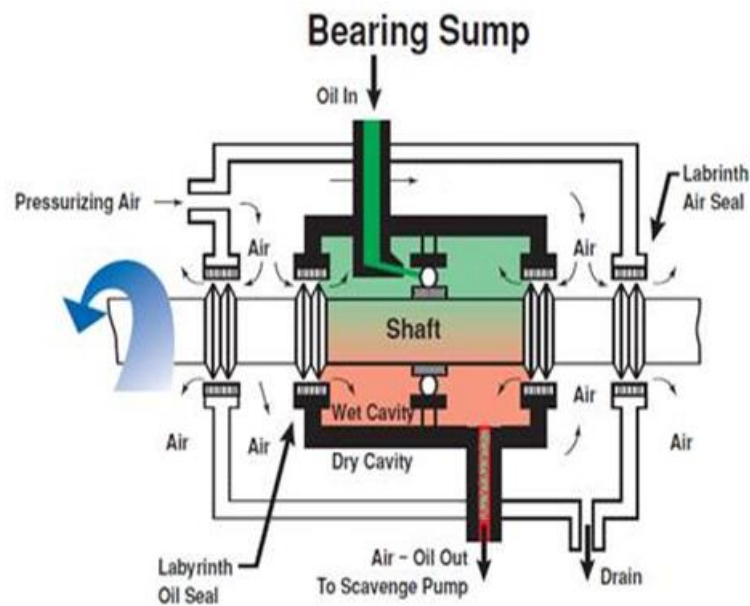


Figure 1: Bearing Sump - Typical Application for a Liquid-Gas Mixture Model.

The new “liquid-gas” fluid model in Flownex® is ideal for the accurate prediction of the flow regimes and pressure drop of air-oil flow in many industrial applications. For example, in aero-engines, air and lubrication oil are mixed in a bearing chamber, which is subsequently drained by a scavenging system comprising of a pump and piping system where the air and oil are separated.

The complex nature of this two-phase flow, characterized by turbulence, a deformable phase interface, phase interaction, phase slip, and compressibility of the gas phase makes the mixture difficult to analyse and therefore makes these lubrication systems difficult to simulate.

To overcome these difficulties, Flownex® has added an updated set of governing equations to describe the interaction of the phases. Additional pressure drop and flow regime correlations have also been added to provide a commercial solution to the design of pressurised lubrication systems.

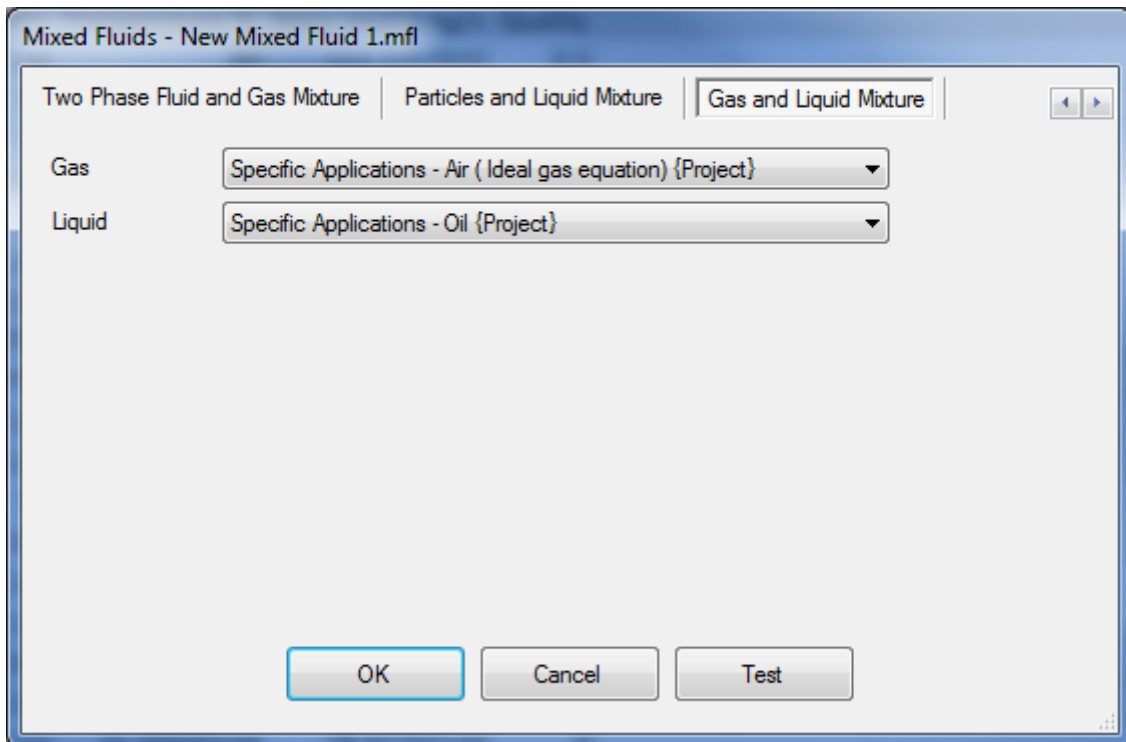


Figure 2: Gas and Liquid Mixture specified in Flownex®.

3.1.2 FMI Support

The ability has been added for Flownex® to export a network as a FMU (Functional Mockup Unit).



Figure 3: FMI (Functional Mock-up Interface).

This FMU is FMI 2.0 standard compliant and can be used for co-simulations in any FMI 2.0 co-simulation master application.

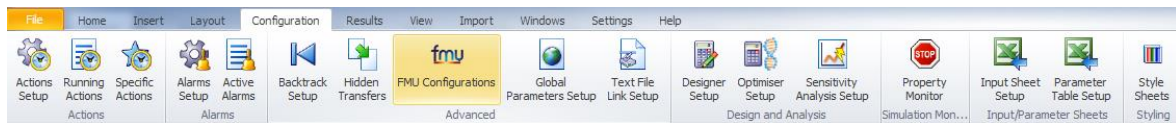


Figure 4: FMU Configurations Button available in the Configuration Tab.

The FMU Configurations is described in more detail in Chapter 14 of the Flownex® General User Manual.

3.1.3 Disabled Solving

All solving disabled components and links are now clearly indicated with a red cross on the drawing canvas, as seen in Figure 5.

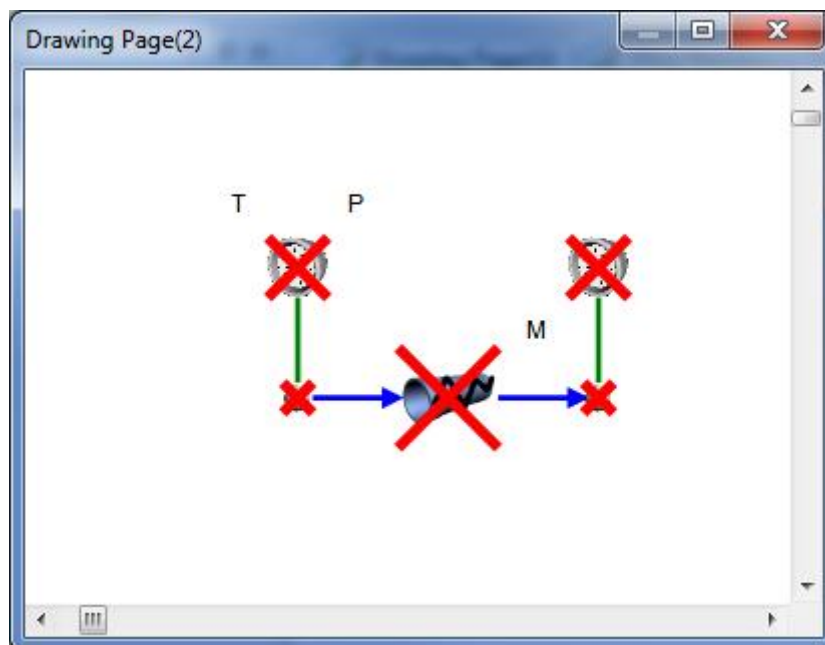


Figure 5: Disabled Solving Components.

3.1.4 Data Transfer Links

An error or warning is now given when data transfer encounters NAN or infinity. There is a setting in the project settings where this can be controlled, as seen in Figure 6.

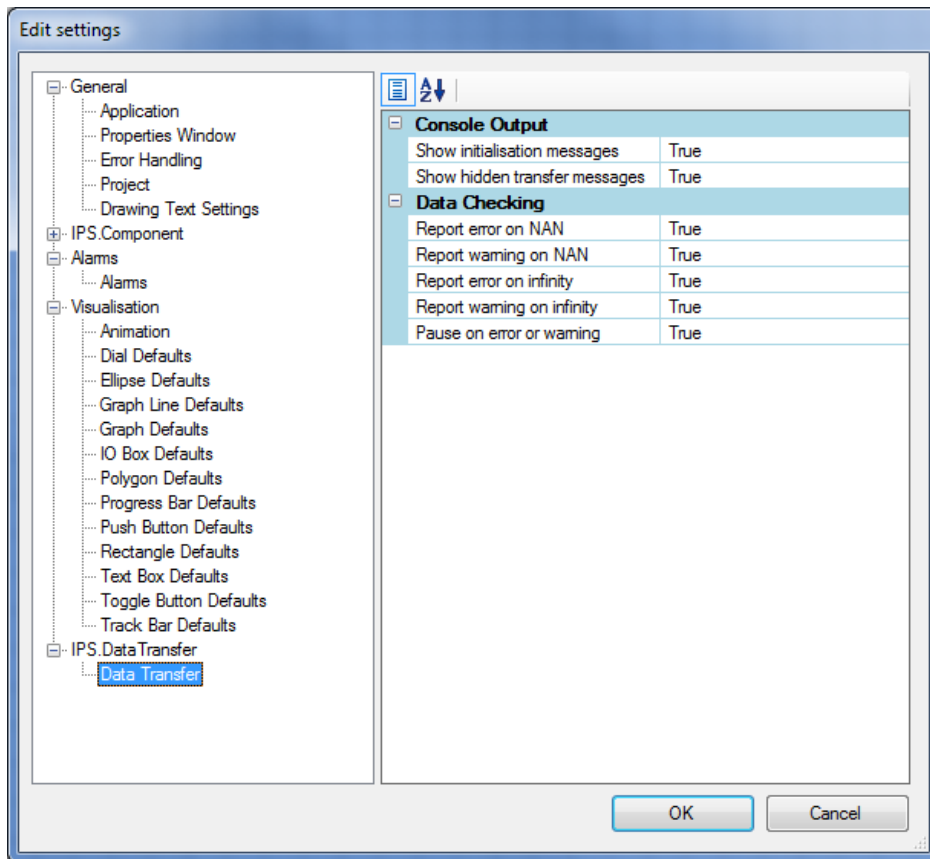


Figure 6: Data Transfer Settings in Edit Settings Dialog.

There is also an option to pause simulation if error or warning occurs during data.

3.1.5 Global Parameters

A list of current global parameters will now pop up when a user starts to type a global parameter in the property grid. To see the list, start typing the "\$" symbol in a field in the property grid.

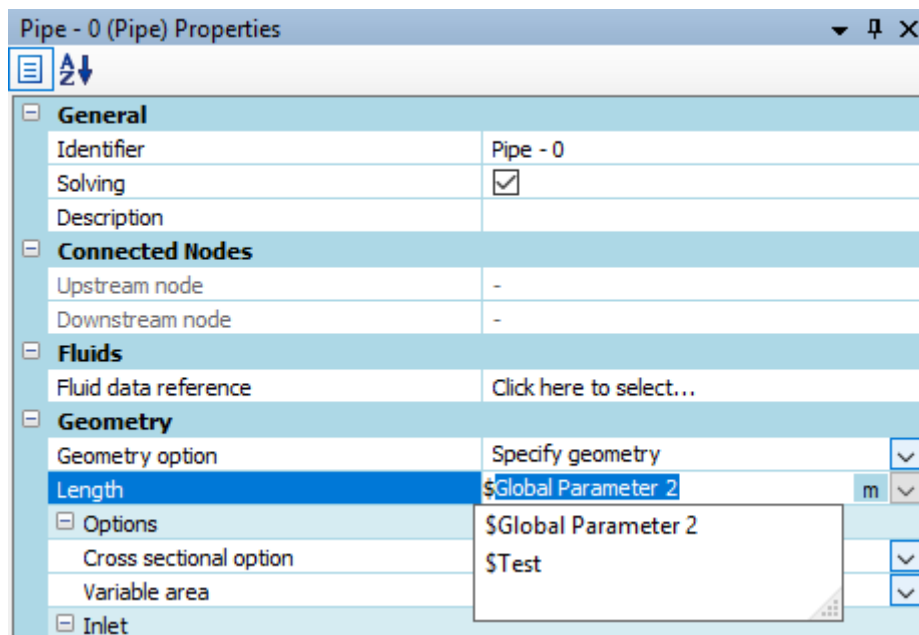


Figure 7: Global Parameters List.

3.1.6 License Queueing

The capability was added to queue for a license. License queueing can be enabled from the Help ribbon, or from a button on the License error dialog.



Figure 8: License Queueing Capability added to Flownex®.

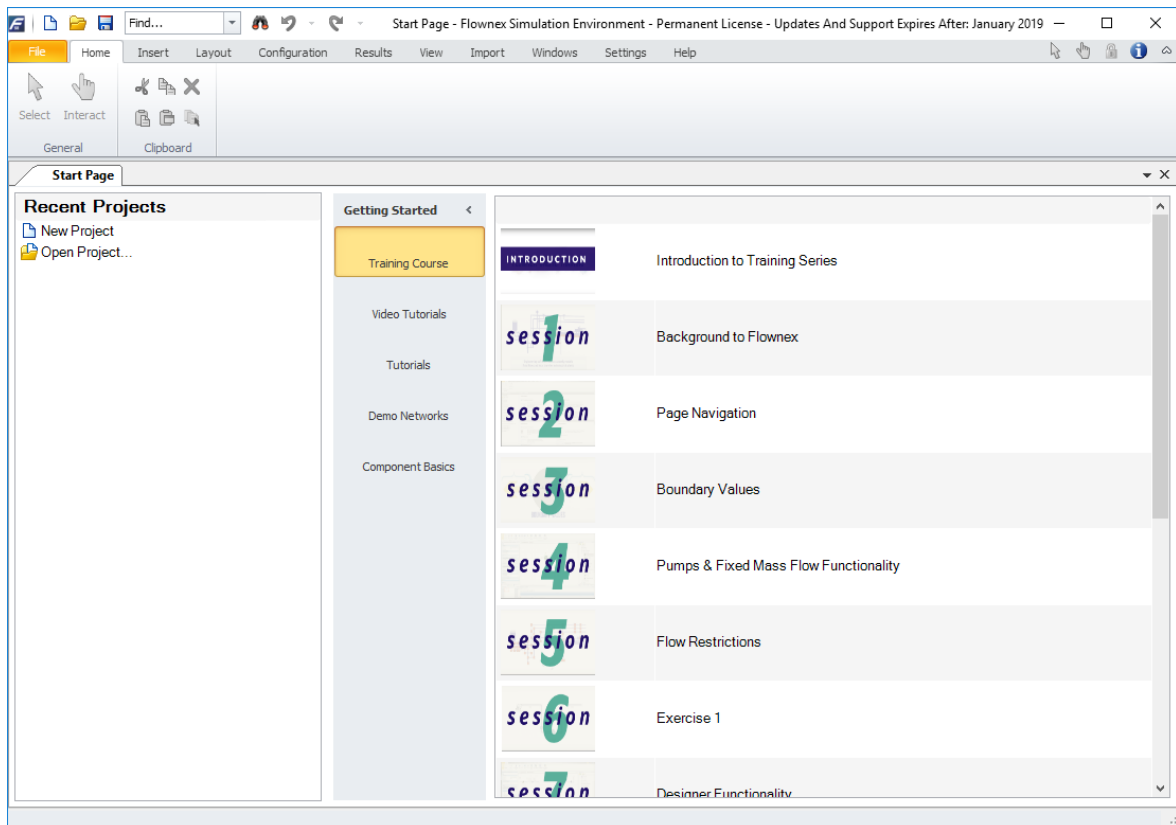
3.1.7 CFX Generic Interface Coupling

The CFX Generic Interface Coupling component has been updated to reduce solving time. The previous component passed boundary conditions to the CFX solver, started the CFX solver, waited for the CFX solver results and used the results together with expressions in CFD-Post (CFX post processing tool) to return updated boundary conditions. The CFX solver and CFD-Post tools therefore started and stopped each time where information was transferred.

The new coupling allows the Flownex® and ANSYS CFX solvers to run uninterruptedly while updating variables between the environments based on User Fortran routines. CFD-Post is not used to retrieve the updated boundary conditions from the CFX solver results. The CFX solver will not be started and stopped every time information is transferred. This removes the overhead in the CFX processing and cuts the solving time dramatically.

3.1.8 Training Course

The Flownex basic training course that is available on the Flownex website for registered users was put onto the start page of Flownex. The links on the page link to Youtube videos, so users need to have access to Youtube to view them. In countries without access users can view them by registering on the Flownex website.



3.2 MINOR ENHANCEMENTS

3.2.1 Databases

Added a dialog for the user to confirm if components should be deleted from the project or an external database.

3.2.2 API

Added a function to NetworkBuilder so that the user can specify which fiber to use when connecting components/compounds with many fibers.

3.2.3 Convection Component

Added the capability for the user to specify a script defined heat transfer coefficient to the Convection element. The input options were changed to be more in line with other places that convection is specified.

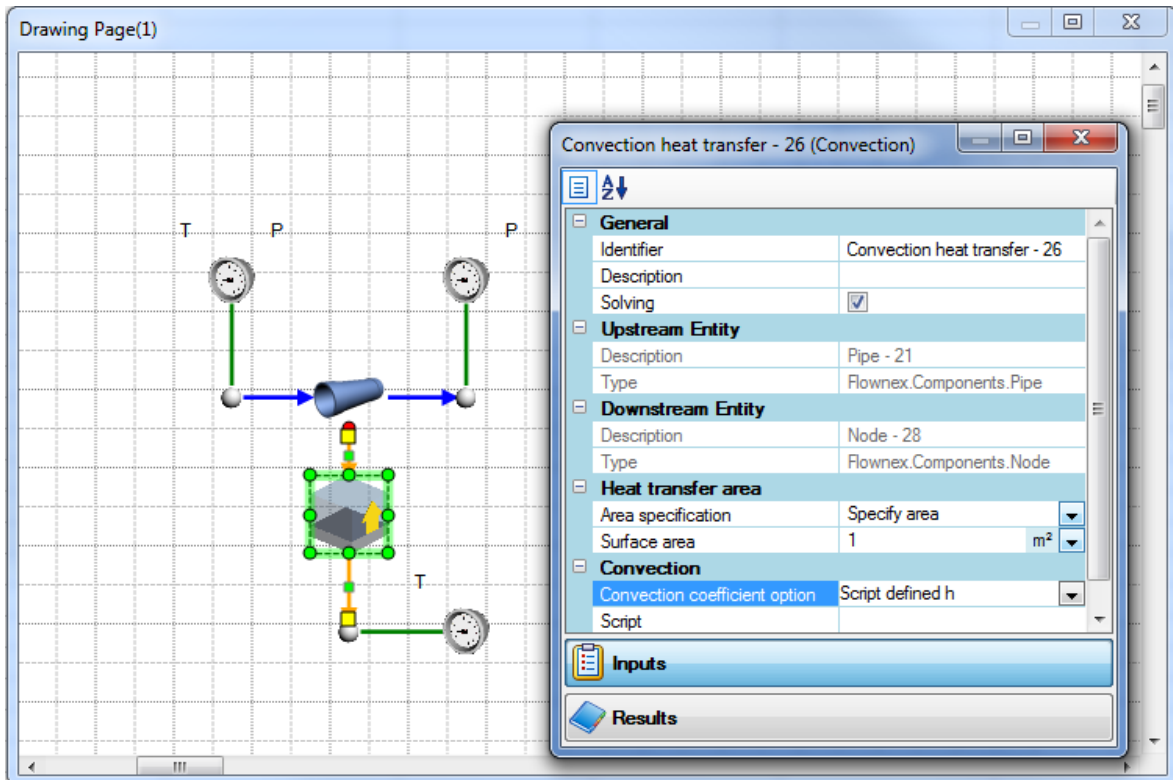


Figure 9: Convection Element with Script Defined Heat Transfer Coefficient Input.

3.2.4 Finned Tube Heat Exchanger

The Wall Heat Transfer Coefficient has been changed to a dynamic input, so that this input can be changed during a transient simulation, as seen in Figure 10.

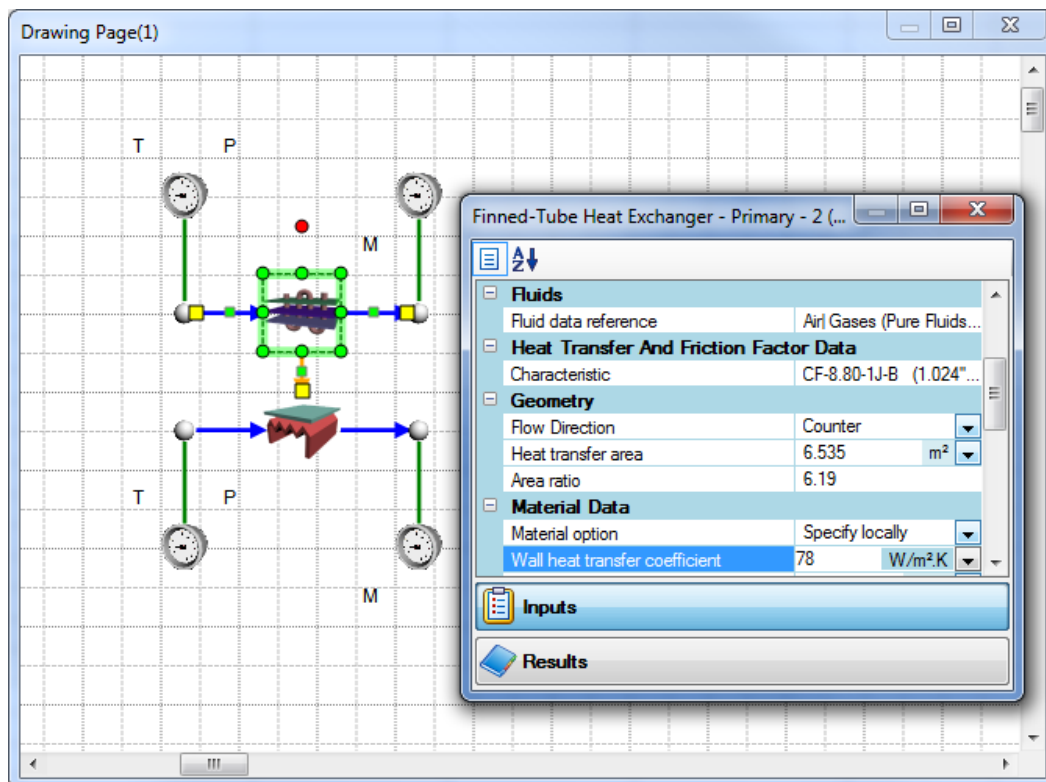


Figure 10: Wall Heat Transfer Coefficient of the Finned-Tube Heat Exchanger.

3.2.5 Nuclear Reactor

- Added Flow element maximum velocity to the Reactor as a result.
- Show velocity in x and y direction on nodes in the general fuel.
- Show generated heat on flow nodes.

3.2.6 Nozzle and Rotating Nozzle

- Added additional discharge coefficient (Cd) correlation option that is independent of diameter ratio.

3.3 BUG FIXES

3.3.1 Global Parameters

- Fixed the problem where the Global Parameter name could not be edited.
- Fixed the problem where non-SI units caused wrong values to be used initially when creating Global Parameters from the Property Grid.

3.3.2 Property Grid

- Fixed the problem where the go-to disabler on disabled property grid properties showed only one data transfer link, even when many properties are disabled by different data transfer links.

3.3.3 Excel Component

The automatic linking of properties to cells in the Excel component by dragging and dropping them on Excel cells did not work and has been fixed.

3.3.4 Grid Editor

Fixed the problem where the drop downs caused errors in the Grid Editor when showing them and moving over them.

3.3.5 Component Defaults

Fixed the problem that occurred with component defaults not being able to be dragged into the project tree.

3.3.6 Discharge Coefficient on Nozzles

Fixed discharge coefficient (Cd) calculation for chamfered inlets.

3.3.7 Rotating Cavities

Fixed incorrect indexing used in the solver under some conditions for the Rotor-Rotor and Rotor-Stator cavities.

4. Manual Updates

The following sections in the Flownex® General User Manual have been updated:

- Added a section related to the new license queueing feature in Flownex®.
- Added a section related to the FMI Support in Flownex®.
- Added a section related to the Gas and Liquid mixtures that can now be specified in Flownex®.
- Updated the section related to the CFX Generic Interface component.
- Updated necessary screenshots.

The following sections in the Flownex® Library Manual have been updated:

- Fixed the Chamfered Cd calculation related to the Nozzle component.



- Added an additional Cd calculation for the Sharp Edge Orifice related to the Nozzle component.
- Updated the General Empirical Relationship component to include elevation in pressure drop equation.

The following sections in the Flownex® Theory Manual have been updated:

- Updated the Two-Phase Pressure Drop multipliers section to include the theory related to liquid-gas mixtures.

The following tutorials have been updated:

- Updated a screenshot in Tutorial 36.
- Added Tutorial 42 that is related to the new CFX Generic Interface component.
- Updated the video tutorials.