High Resolution Flow Solver on Unstructured Meshes (HiFUN)

GUI Documentation

(Version 3.1.1)

Project Execution Team

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Note: This document assumes that user is executing commands on Linux operating system in bash shell

Install HiFUN using installation package provided by us.

Install HiFUN

At the end of successful HiFUN installation, installation screen will provide list of environment variables to be set in user's .bashrc file. These environment variables are necessary for HiFUN execution.

The environment variables that need to be defined in .bashrc file as follows:

source <<installation path of package>>/hifunrc

File 'hifunrc' will be having following Environment Variables, necessary for HiFUN execution.

HiFUN=<installation path of package>

PATH=$HiFUN:$PATH

export HiFUN PATH

OPENMPI=${HiFUN}/Third_Party

PATH=$OPENMPI/openmpi-1.3.3/bin:$PATH

export OPAL_PREFIX=$OPENMPI/openmpi-1.3.3

export LD_LIBRARY_PATH=$OPENMPI/gfortran:$LD_LIBRARY_PATH

export LD_LIBRARY_PATH=$OPENMPI/openmpi-1.3.3/lib:$LD_LIBRARY_PATH

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Install Chitragupta

At the end of successful Chitragupta License Manager installation, installation screen will provide list of environment variables to be set in user's .bashrc file. These environment variables are necessary for to use Chitragupta License Manager.

The environment variables that need to be defined in .bashrc file as follows:

if [-f <<installation path of package>>/chitraguptarc]

then

source <<installation path of package>>/chitraguptarc

fi

File 'chitraguptarc' will be having following Environment Variables, required for license manager usage.

CHITRAGUPTA=<installation path of package>

PATH=$CHITRAGUPTA:$PATH

export CHITRAGUPTA PATH

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License Manager: CHITRAGUPTA

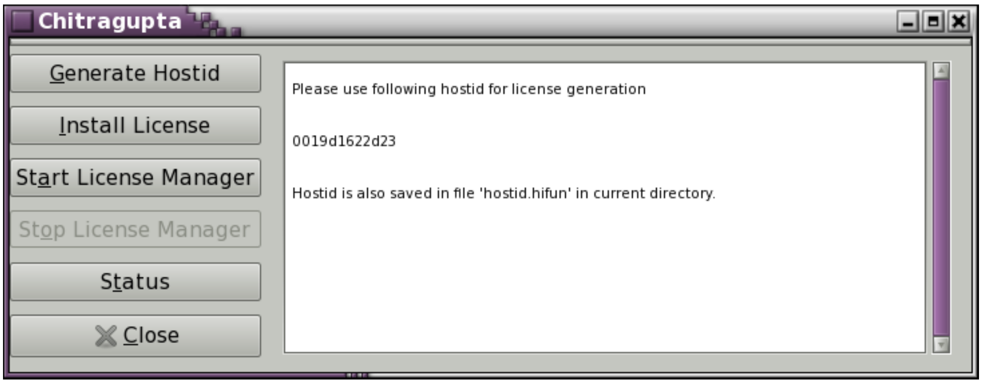
“Chitragupta” is a floating (or network) license manager. User will be able to install the license manager using installer script provided by us.

How to use license manager in GUI mode?

- To start application, run command ‘*chitragupta*’ from command prompt.

<u>**Main application window**</u>**:**

Generate Hostid:



- Click 'Generate Hostid' button to generate host id of system for issuing license file (refer above figure). This will also create file 'hostid.hifun' in current directory containing host id of system.
- To generate license file, please send us file 'hostid.hifun' along with IP address of the machine.
- Once user receives license file from us, proceed to install license file.

Installing License:

To configure license manager, set following parameters (refer figure below):

  - License File (Complete path to license file sent by us)

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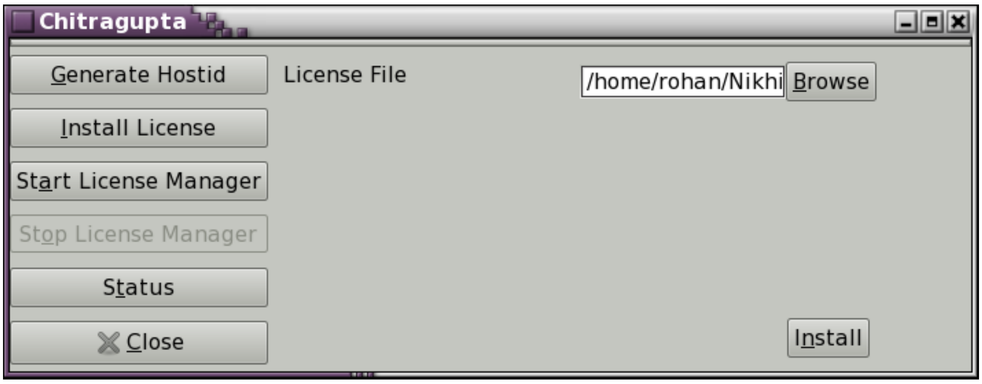
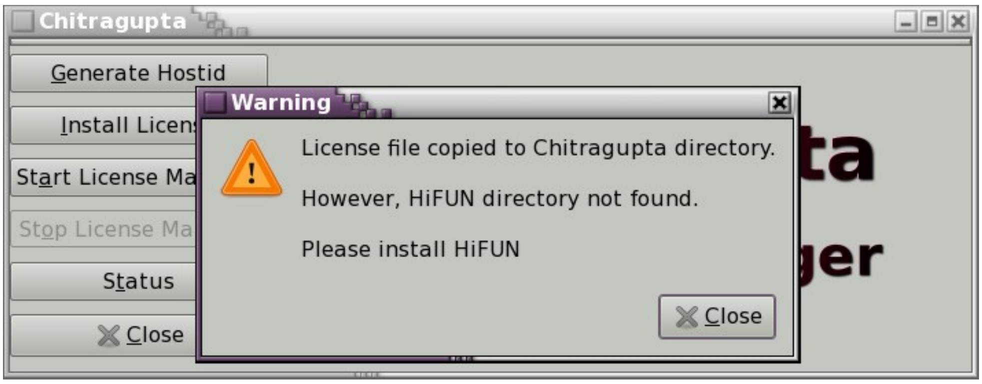


- Once license file path is set, click on “Install” (refer above figure)
- This will install license file to License manager directory & hifun-3.1.1/License directory.
- If License file get installed properly, following message window will pop up.

- If HiFUN is not installed on users system, application will pop up with license installation error (refer figure below)



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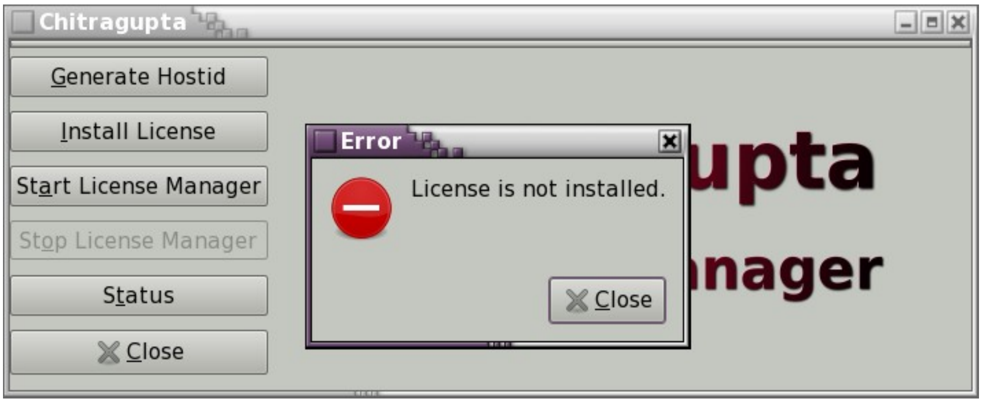
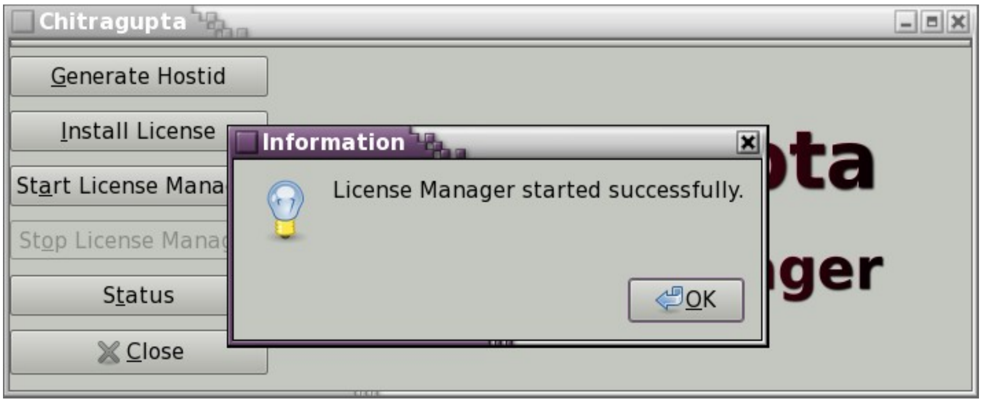
- If license file is not installed, application will not be able to start license manager (refer image below)



Starting License Manager:

- To start license manager, click on button "Start License Manager" (refer figures above & below)



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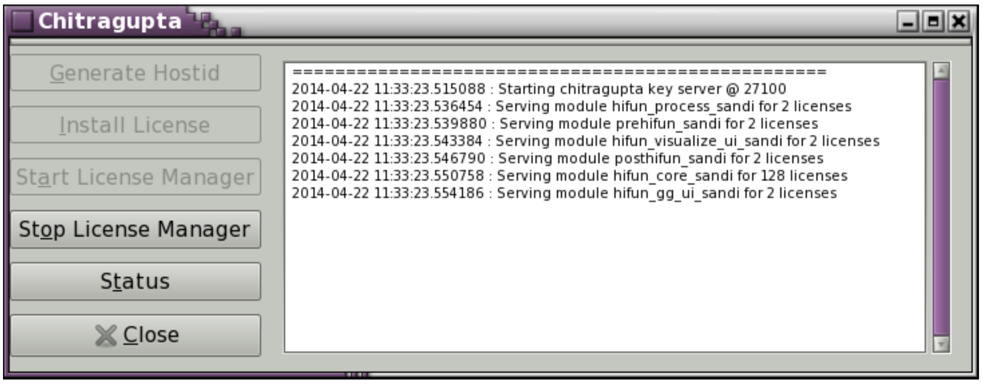
Checking Status:

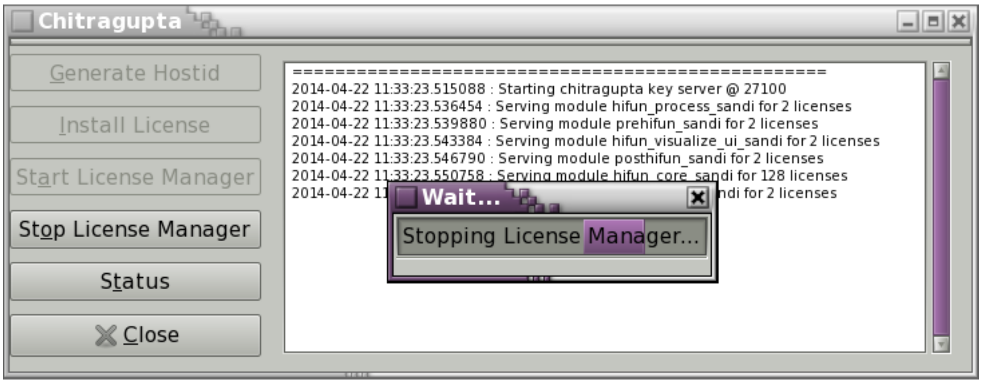
- To check license manager status, Click on button “Status” (refer to figure below)



Note: The current status of license manager can be checked by clicking on the button “Status”

Stopping License Manager:

- To stop license manager, click the button “Stop License Manager”



Closing the window:

- To close the window, click the button “Close”
- Even after closing the window, license manager will run in background.
- User can restart the application by issuing command “chitragupta”. On start up, the application will check whether or not license manager is running in background.
- In the event of license manager running in background, application will open status window displaying the current status of license manager.

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Command Line Usage of License Manager:

LICENSE MANAGER INSTALLATION STEPS

- Untar and uncompress file Chitragupta.tar.gz

  Command: tar -xjvf Chitragupta.tar.gz

- Goto directory Chitragupta
- Command: cd Chitragupta
- Untar and uncompress packages openssl-lib64.tar.bz2 and python-2.6.6-install.tar.gz, chitragupta.tar.gz

  Command: tar -xvf chitragupta.tar.gz

  Command: tar -xvf openssl-lib64.tar.bz2

  Command: tar -xvf python-2.6.6-install.tar.gz

- Open file 'licmanrc' in directory 'Chitragupta' directory and set the variable 'INITAIL_PATH' to absolute path of the directory 'Chitragupta'
- Copy license file 'license.key' given by SandI to directory 'chitragupta'

Chitragupta Installation Directory => <initial_path>/Chitragupta/chitragupta

Contents of directory 'chitragupta'

- chitragupta.dat: The database file
- chitragupta.log: Log file for registering messages
- pychitragupta.py: Python script to start the license manager
- pystopserver.py: Python script to stop the license manager
- pyhostid.py: Python script to get the host information of system

STEPS TO OBTAIN HOSTID

- Goto directory 'Chitragupta'

  cd <initial_path>/Chitragupta

- Source the file 'licmanrc' in directory 'Chitragupta'

  Command: source licmanrc

- Goto directory 'chitragupta'

  cd chitragupta

- Execute following command to obtain hostid

  Command: python pyhostid.py

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- Send the output of above command along with IP address of the machine to facilitate generation of license file

STEPS TO START LICENSE MANAGER

- Goto directory 'Chitragupta'

  cd <initial_path>/Chitragupta

- Source the file 'licmanrc' in directory 'Chitragupta'

  Command: source licmanrc

- Goto directory 'chitragupta'

  cd chitragupta

- Execute following command to start license manager in background

  Command: python pychitragupta.py ./license.key > ./out 2>&1 &

- For possible errors, check the file 'out' in directory chitragupta:

  Command: tail -f out

- To check the process ID of license manager's python script:

  Command: ps -u <account_name> | grep python

  Note: Above command may show more than one python scripts depending on whether or not other applications are employing python.

MONITORING LICENSE MANAGER

Goto directory <initial_path>/Chitragupta/chitragupta

- tail -f chitragupta.log: Command to monitor last few lines of file 'chitragupta.log' for license usage
- tail -f out: Command to monitor last few lines of file 'out' for possible license manager failures
- ps -u <account_name> | grep python: Command to check whether or not license manager is executing in background.

STEPS TO STOP LICENSE MANAGER:

- Goto directory <initial_path>/Chitragupta and source file 'licmanrc'

  Command: source licmanrc

- Goto directory chitragupta and execute following

  Command: python pystopserver.py ./license.key

- If python script running in background becomes defunct after execution of command in step 1, it needs to be killed explicitly using following commands:

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(a) ps -u <account_name> | grep python => Gives the integer process ID <PID>
(b) kill -9 <PID>

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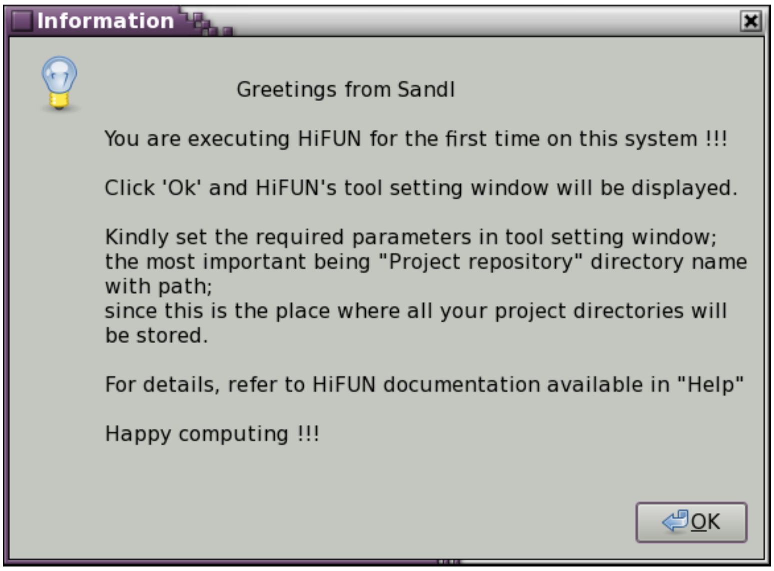
To start HiFUN application, run command ‘hifun’ from command prompt

Main application window:

Menubar:

The menu bar of main application window has six menus with different sub-menus. The sub-menus will be explained one-by-one in this documentation.

Welcome Screen:



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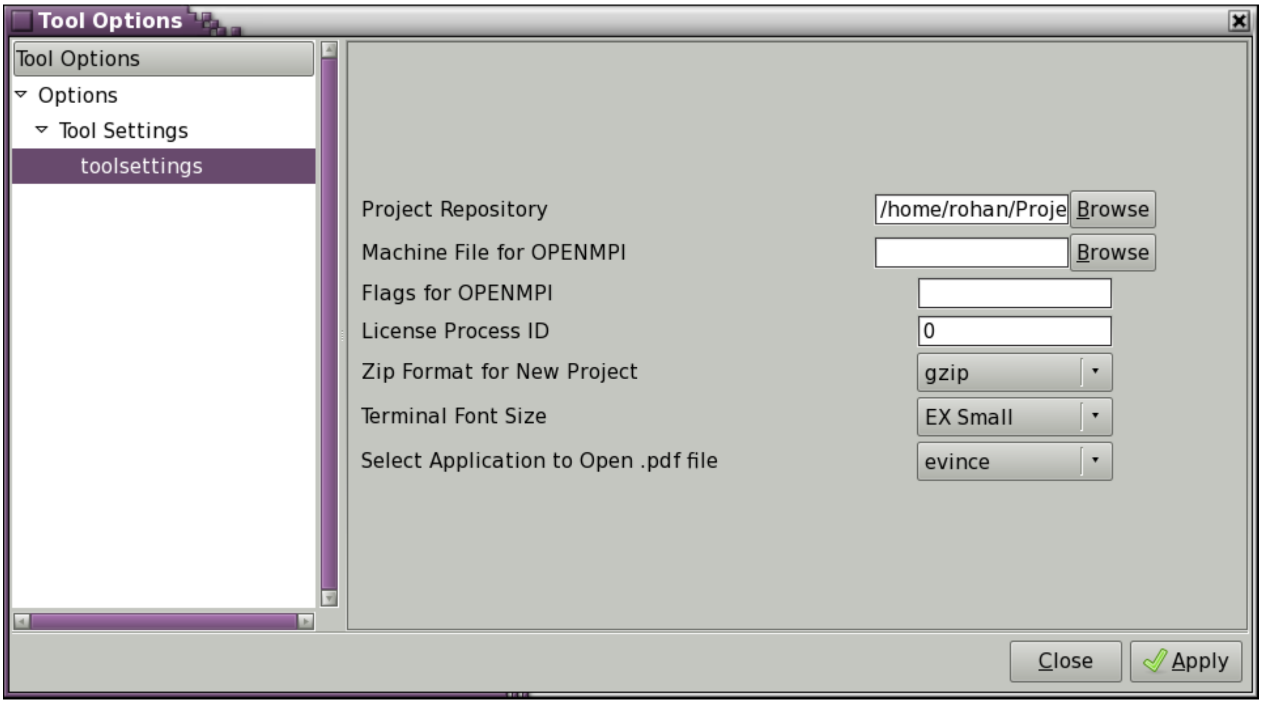
Tools Menu:

Tools menu is used to set global options specific to the main application.



Options:

Project Repository: Sets Project Repository path. This path will be used to store data pertaining to new projects.

Machine File for OPENMPI: To execute the flow solver through GUI in parallel using openmpi, machine file is required. Machine file has following format

<hostname1> slots=<number of cores>

<hostname2> slots=<number of cores>

....

....

....

Flags for OPENMPI (optional): Machine specific flags to be passed on to OPENMPI.

Zip Format for New Project: The storage space on hard drive pertaining to data required by application during project execution can by reduced considerably by zipping the data. The application supports three zipping formats, namely gzip/gunzip, bzip2/bunzip2 and xz. The default zip format is gzip. gzip format gives fast data input/output with reasonable data compression. The other formats provide higher data compression but at the cost of slow input/output. Hence gzip format is recommended over other two formats. If selected zipping format is not available on user's system, default zip format (i.e. gzip) is used. Kindly note that only those zipping options that

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are available on the system will be displayed here. If none of the zipping options are available on system, the application will handle unzipped data.

License Process ID: This is an integer ID of MPI process that will communicate with license manager for checking out/in licenses. Its default value is 0.

Terminal Font Size: Font size of text to be displayed on application's terminal window. In case user changes font size during a session, this change will come into effect for text to be displayed on terminal after the change has been made.

Select Application to open .pdf file: Select application to be used to open HiFUN documentation provided in PDF format. Out of following PDF readers,this option will provide a list of PDF readers available on system:

- acroread
- evince
- okular
- kpdf

If none of above PDF readers are available, user has to separately use any other PDF reader to access HiFUN GUI documentation.

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File Menu:

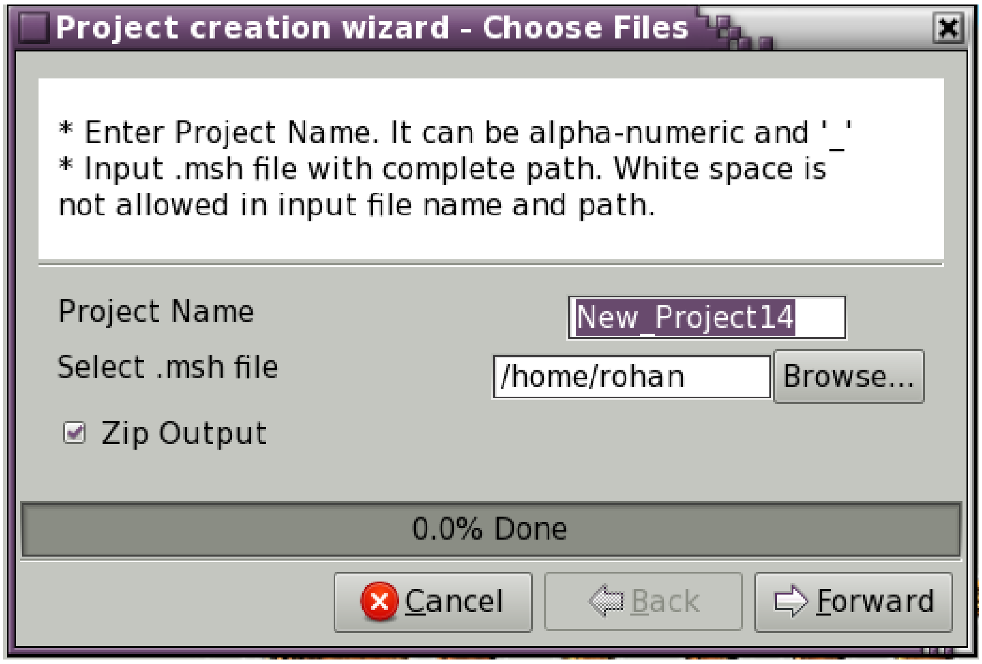
File menu has following four sub-menus:

- New Project
- Open
- Close
- Quit

File->New Project

The sub-menu 'New Project' is used to start a new project. After clicking on this sub-menu, application will pop up first page of project creation wizard window with different options as explained below:

Project creation wizard-- Choose Files:



This is the first page of project creation wizard having following three options:

Project Name: Name of the project. A directory with this name will be created in Project Repository directory where all data pertaining to present project will be stored.

Select .msh file: Input mesh file in Fluent's .msh format. Supporting zip formats will depend on zip options available on system.

Browse...: Button to select input .msh file by browsing through the directories on the hard disk (refer to figure below)

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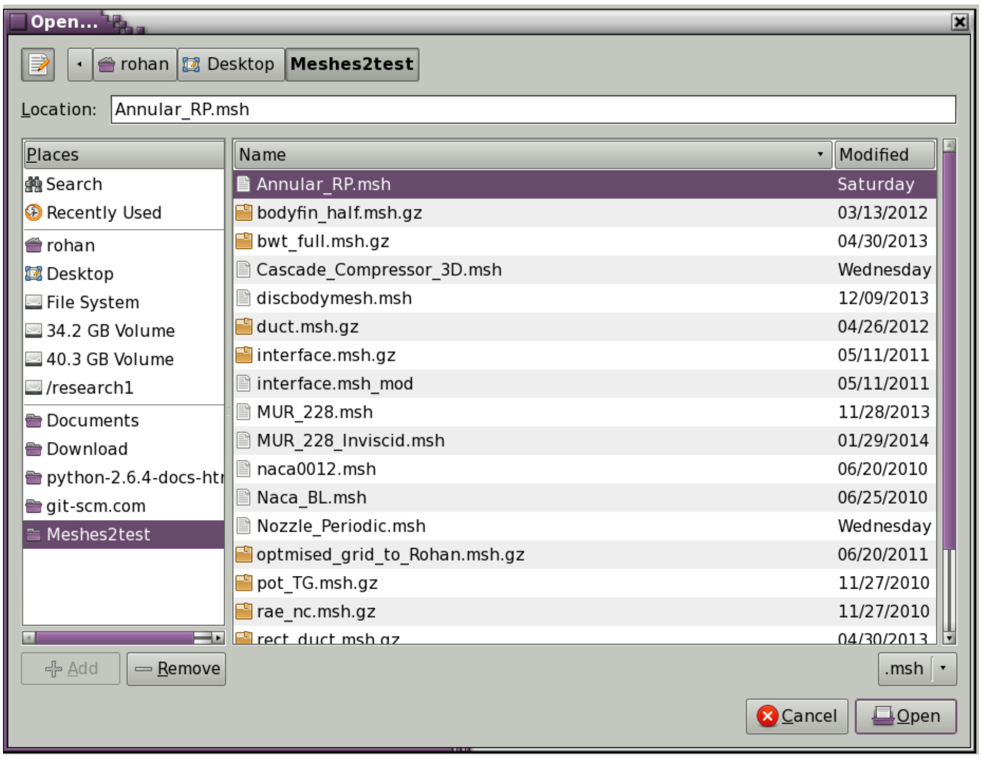
Zip Output: Tick this option to write data in selected zip format (low storage space requirement), remove the tick to write data in ascii format (high storage space requirement). (refer figure above)



After inputting all required input on first page, click button 'Forward' to continue. With this, application will parse input '.msh' file.

The button 'Back' (not active in the first wizard page) can be used to go back to previous wizard page.

Also, It is possible to cancel the wizard at any stage by clicking the button 'Cancel'.

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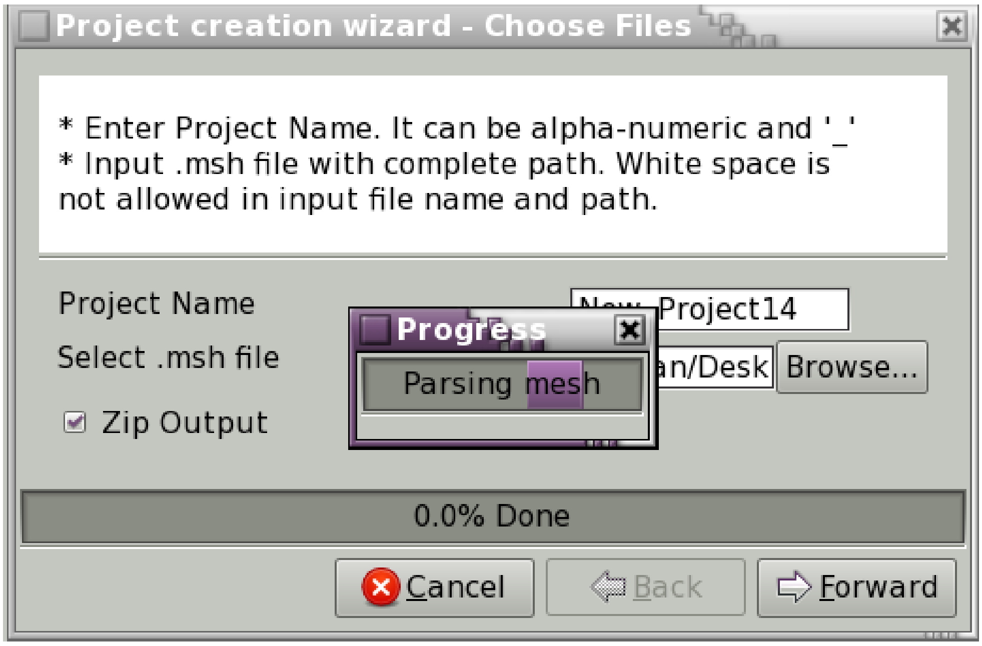

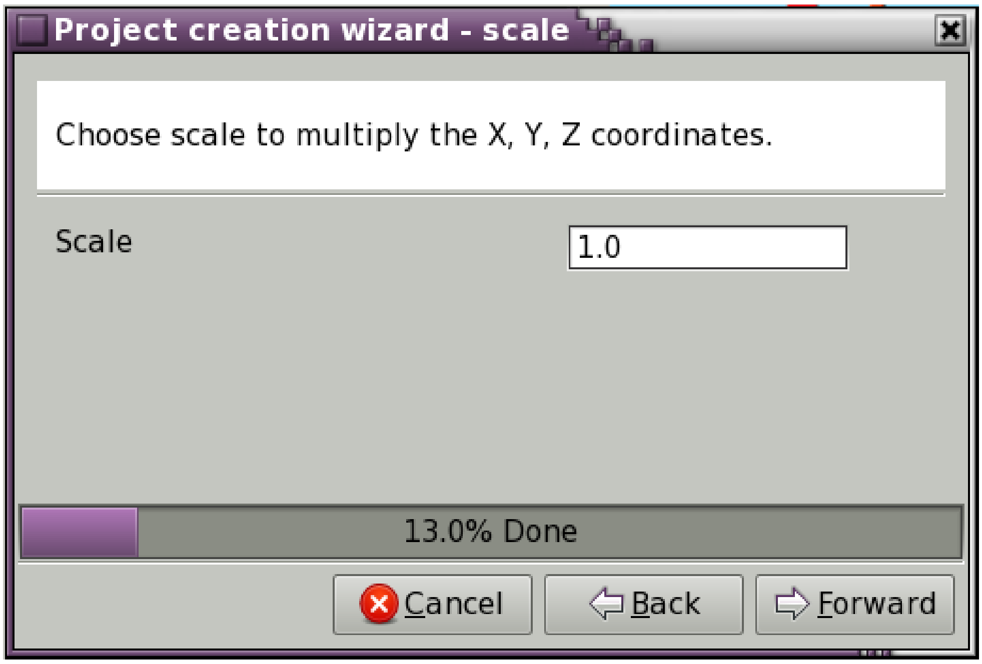

On second page, user should input the scale value to multiply the X, Y and Z coordinates of input mesh. After inputting scale, click forward to go to next page. (refer figure above)

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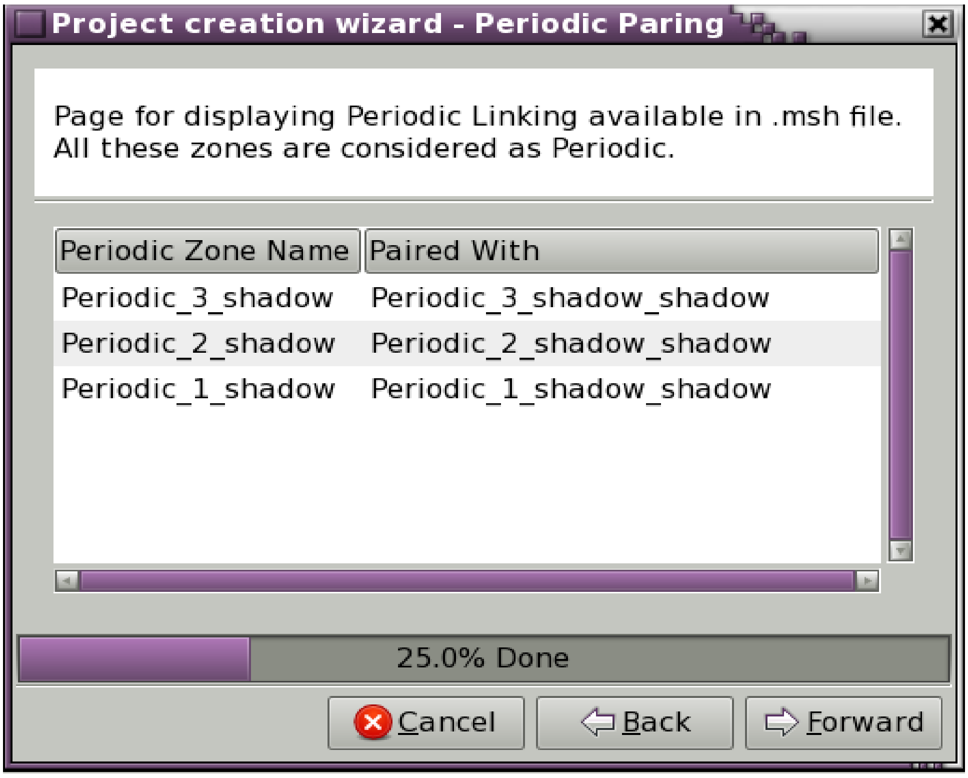

If Periodic zone information is available in .msh file, next page will display linking of periodic zones and their corresponding neighbour zones. All the periodic and neighbour zones will be assigned 'Periodic' boundary condition and these zones will not be displayed subsequently on page corresponding to “Boundary Condition Assignment”.

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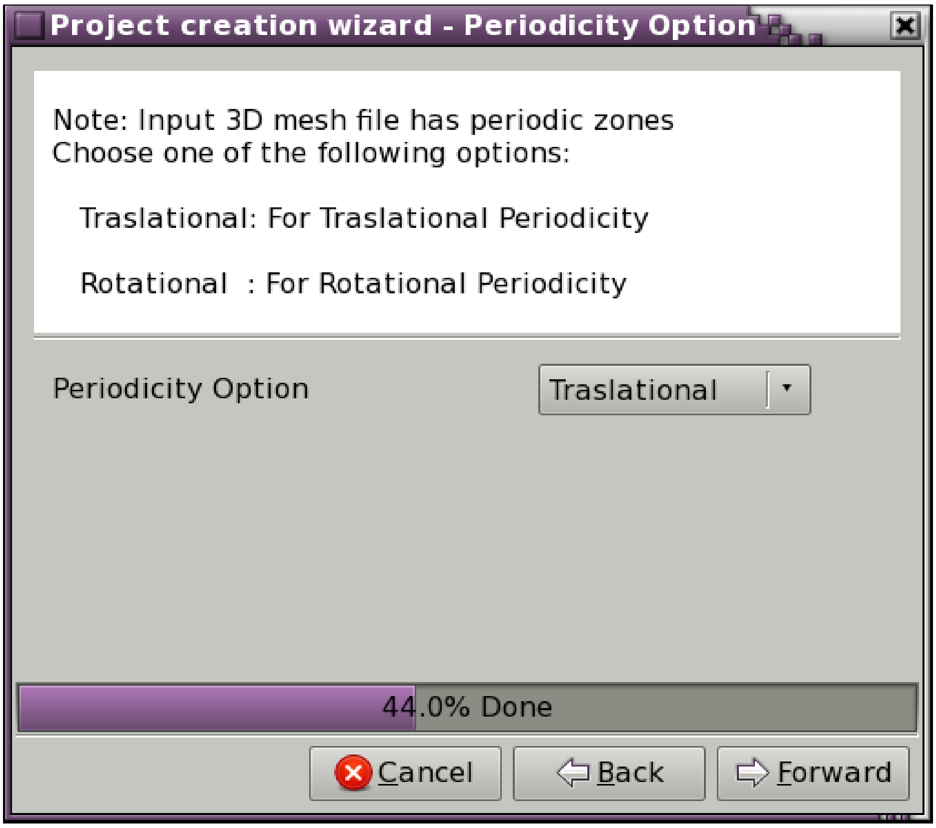
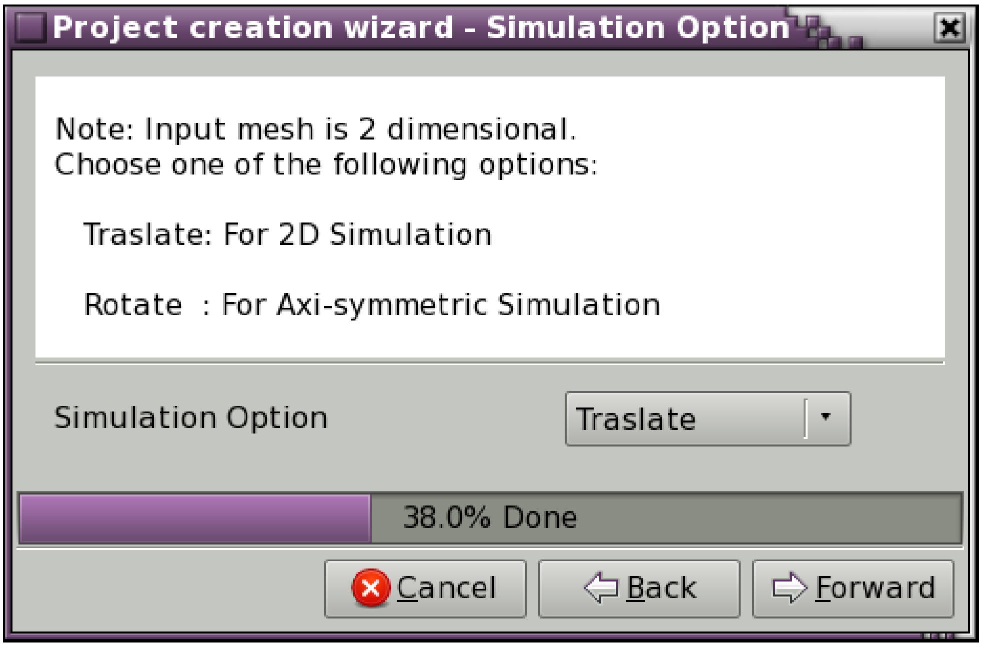


If input msh file contains 3D grid data and periodic zone is available in it, next page will display "Periodicity Option" (refer figure above)



If input msh file contains 2D grid data, the next page will display an option to choose between coopering or rotating 2D grid. (refer figure above). The option cooper should be chosen for

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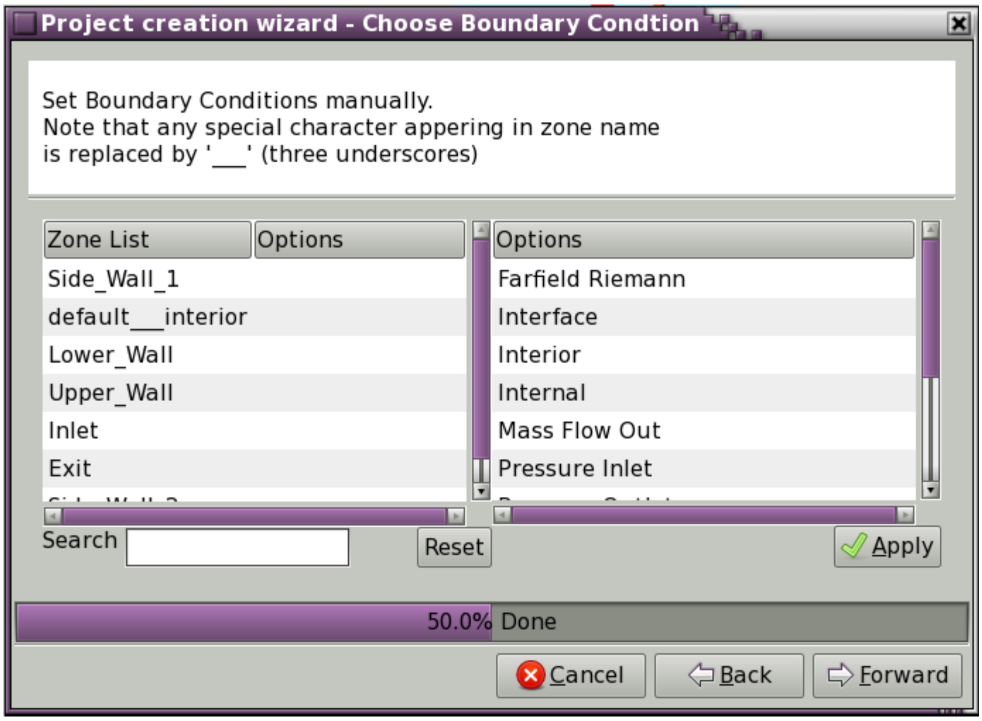
carrying out 2D simulation while the option rotate should be chosen to carry out axisymmetric simulation.

Click button “Next” to assign Boundary Conditions.



On next page, user should assign boundary condition to all the surface zones available in the .msh file. (refer figure above)

Different boundary conditions available are as follows:

- Farfield Reimann
- Internal
- Interior
- Interface
- Mass Flow Out
- Pressure Inlet
- Pressure Outlet
- Rotational Axis

  *(Used for **Rotational Periodicity with zero radius singularity**. Available only for 2D grid with no periodic linking available and user has set option to rotate it.)*

- Supersonic Inflow
- Supersonic Outflow

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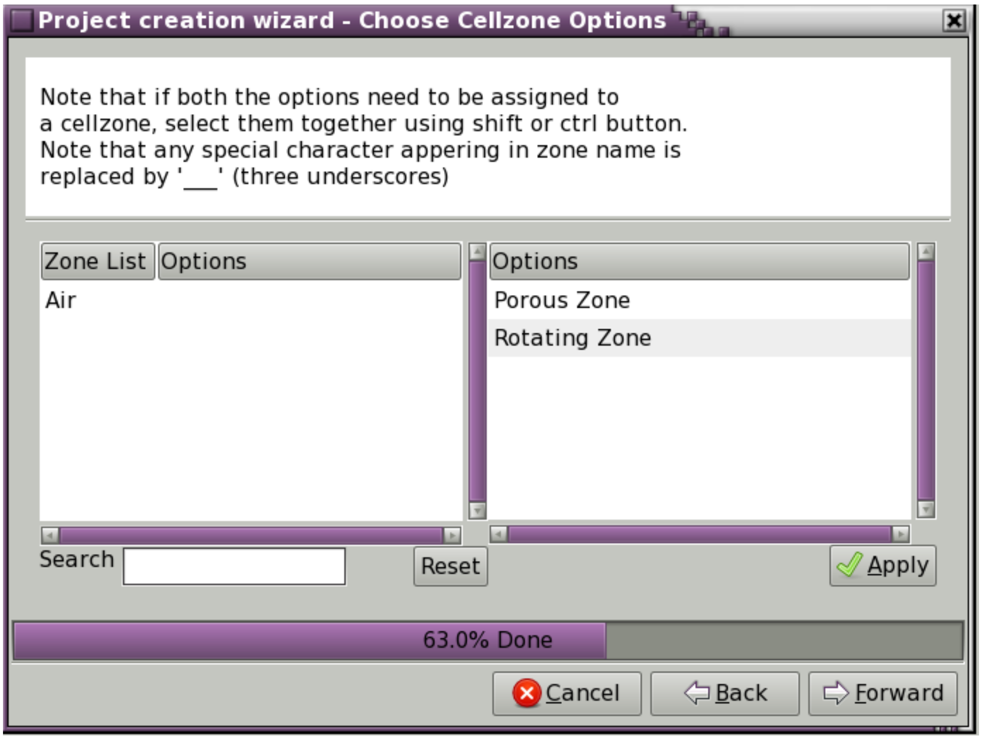
- Symmetry
- Wall

To assign boundary option for a given zone, select zone name from left side list followed by boundary option from right side list and then click on the button 'Apply'.

User can also select multiple zones names from left side list and assign same boundary option from right side list by using shift or ctrl keys.

After assigning boundary condition options to all zones, click the button 'Forward' to go to next page.



The next page pertains to assigning porous/rotating zone options to cell zones present in input mesh file. The user may select one or both options from right side list by selecting them one after another. (refer figure above)

After assigning appropriate options to cell zones, click the button 'Forward' to go to next page.

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If the input mesh contains non conformal block interfaces, wizard will navigate to next page.

On this page, user can select multiple options from both left and right side lists.

For the purpose of pairing, all the interfaces selected on right side list will be paired with each interface selected on left side list.

Pairing all the interfaces in left side list is mandatory. (refer figure above)

After pairing all the interfaces, click button 'Forward' to go to next page.

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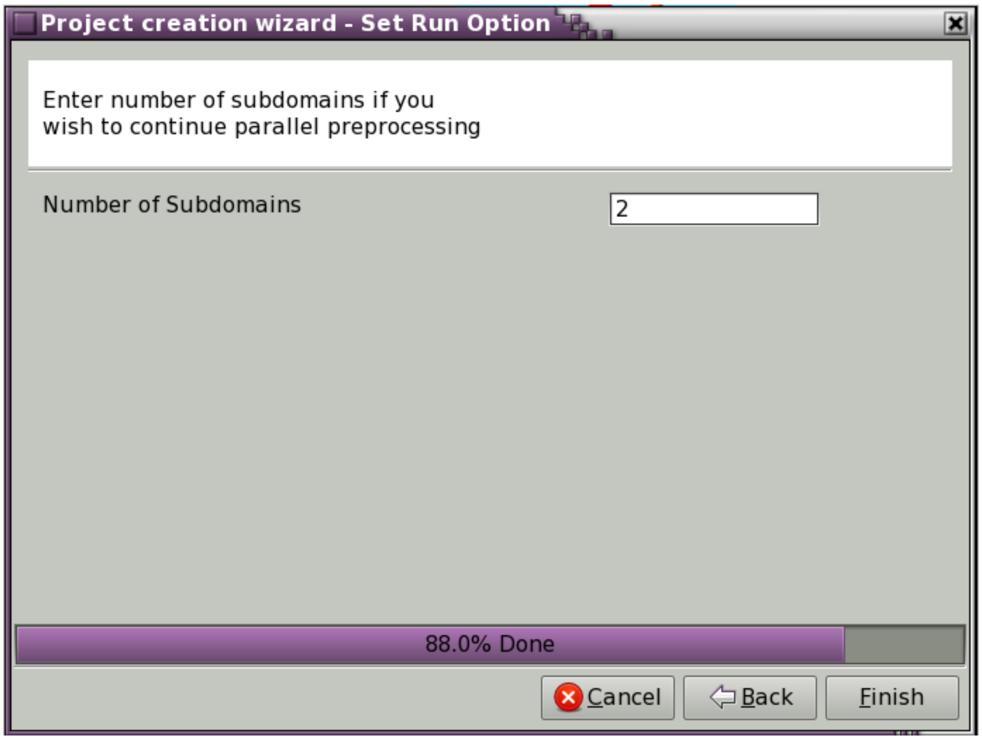

This is the final page of preprocessing wizard to input number of subdomains for parallel run. User can input number of subdomains at this stage or at the time of creation of new run (to be discussed later).

After clicking on button “Finish” (refer above figure), preprocessing of mesh file will begin. All output/errors will be displayed on application's inbuilt terminal. The different steps involved in preprocessing are as follows:

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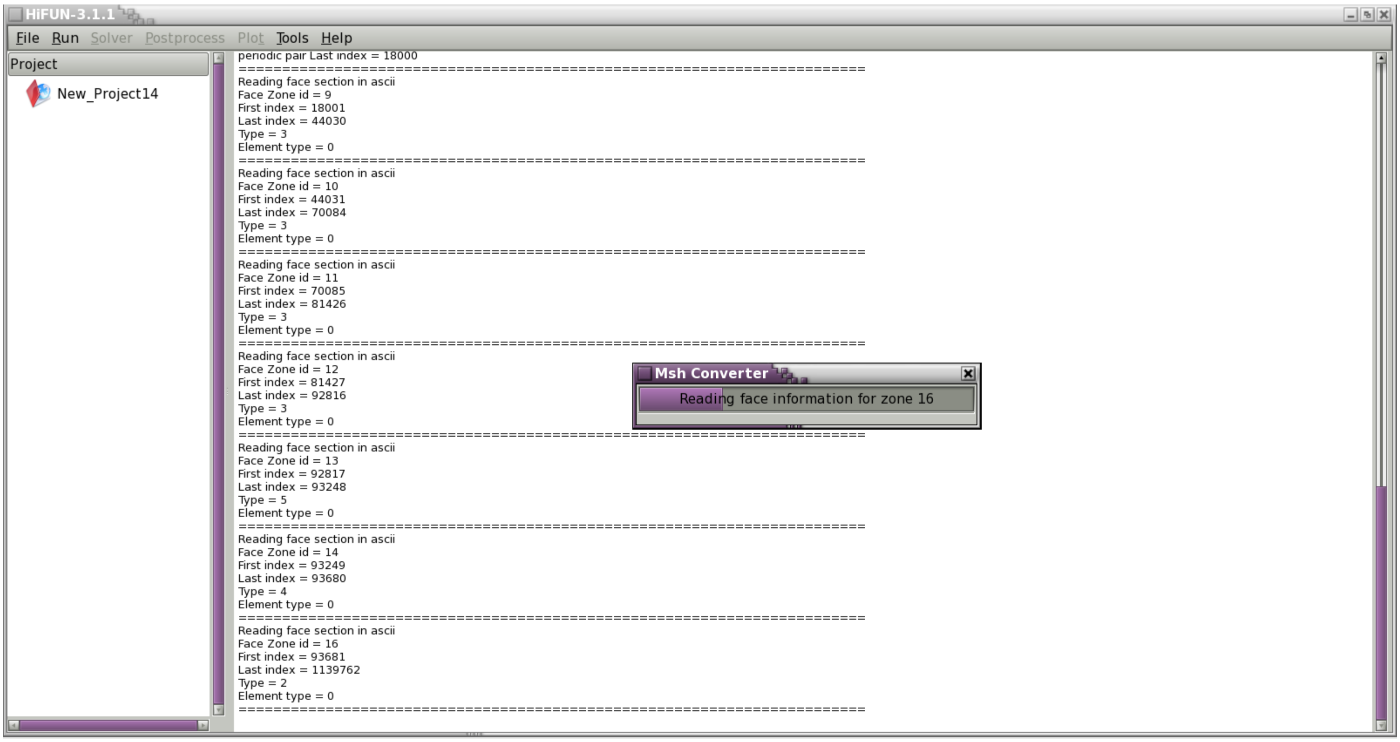
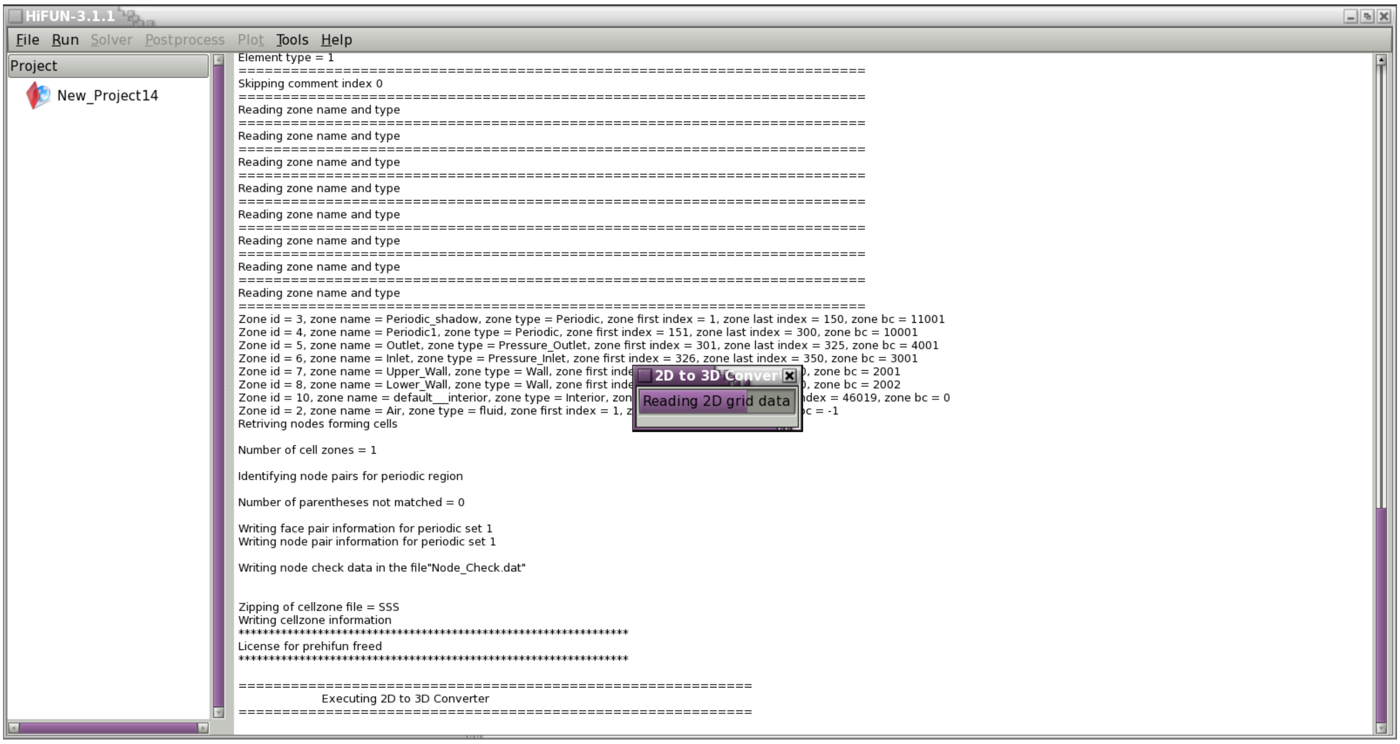
Fluent's ".msh" reader: This step converts the input mesh file from fluent's .msh format to HiFUN's .geo format.



2D to 3D Converter: This step converts 2D grid data to 3D grid data.



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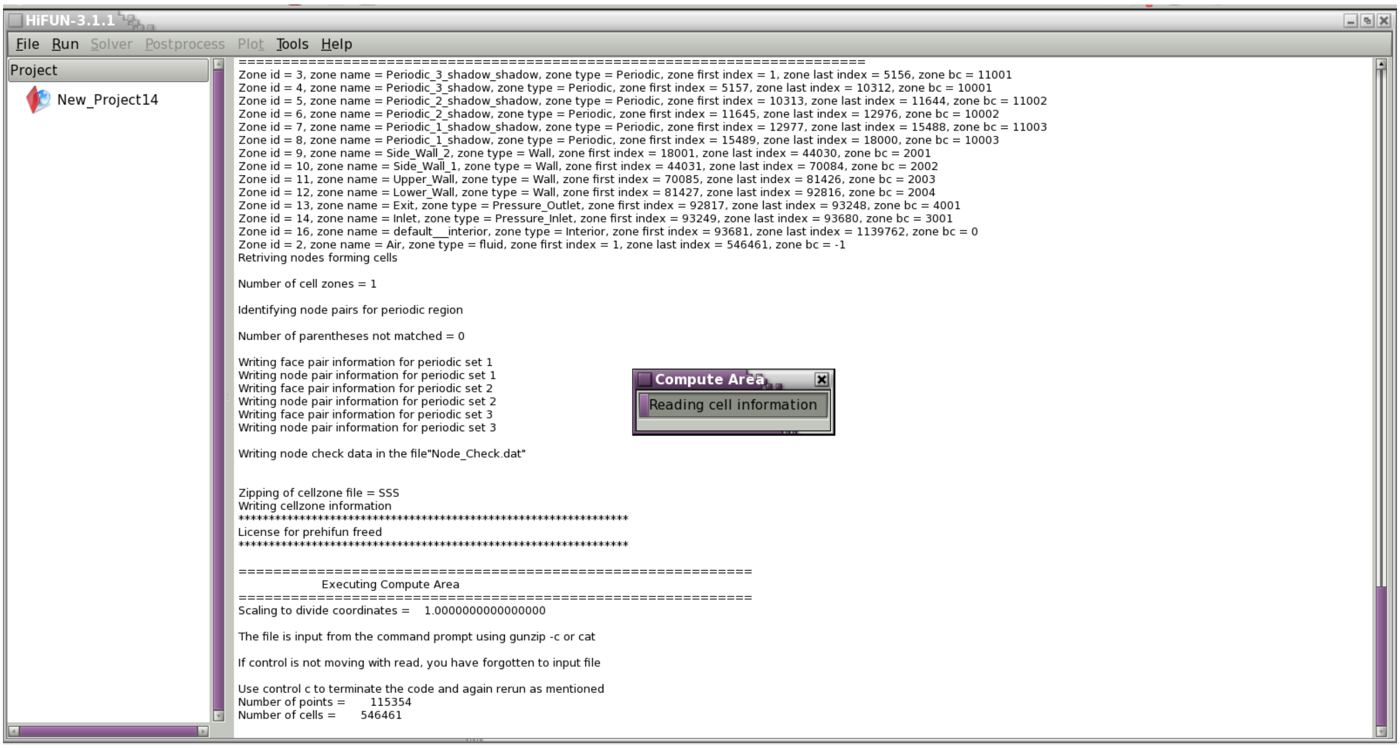
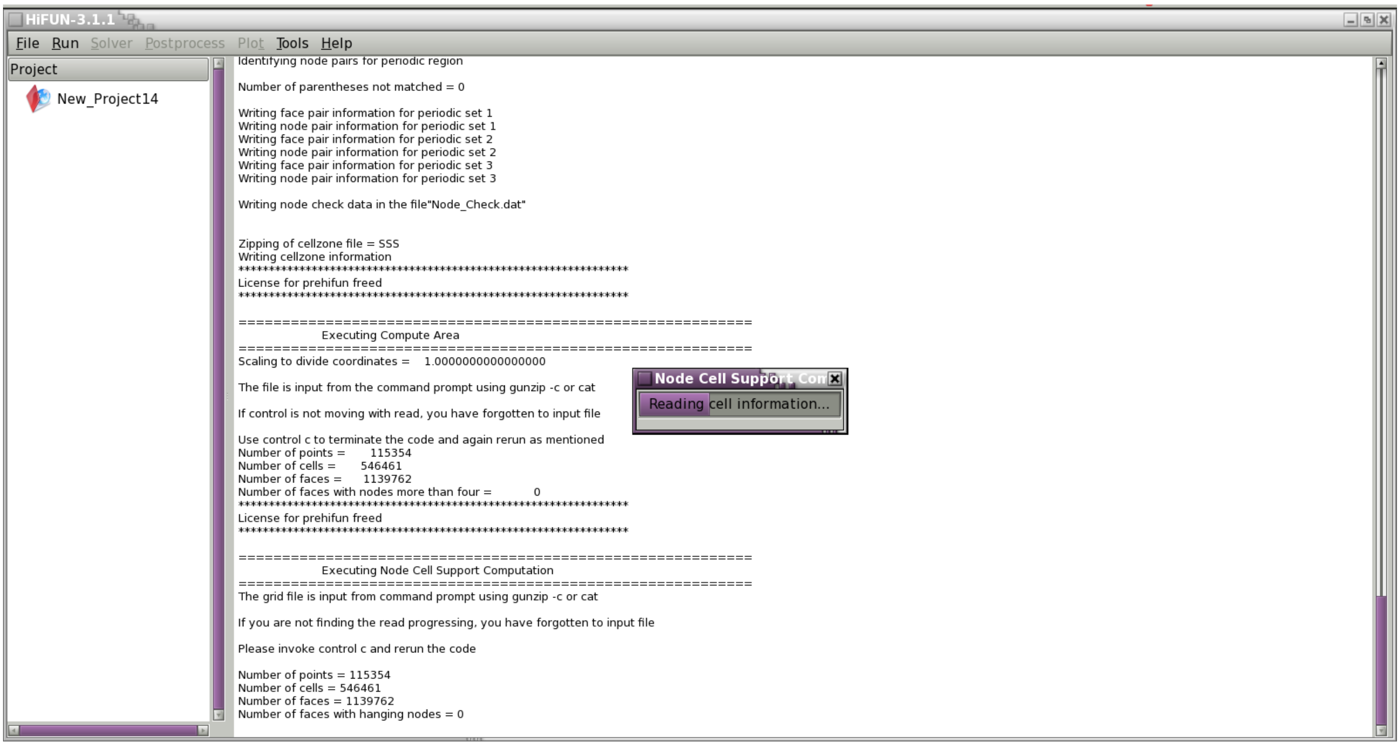
Geometric computations: This step computes geometric parameters required for the flow solver.



Nodal connectivity computations: This step computes connectivity required by the flow solver.



Minimum distance computation: This step computes minimum distance required for turbulent computations.

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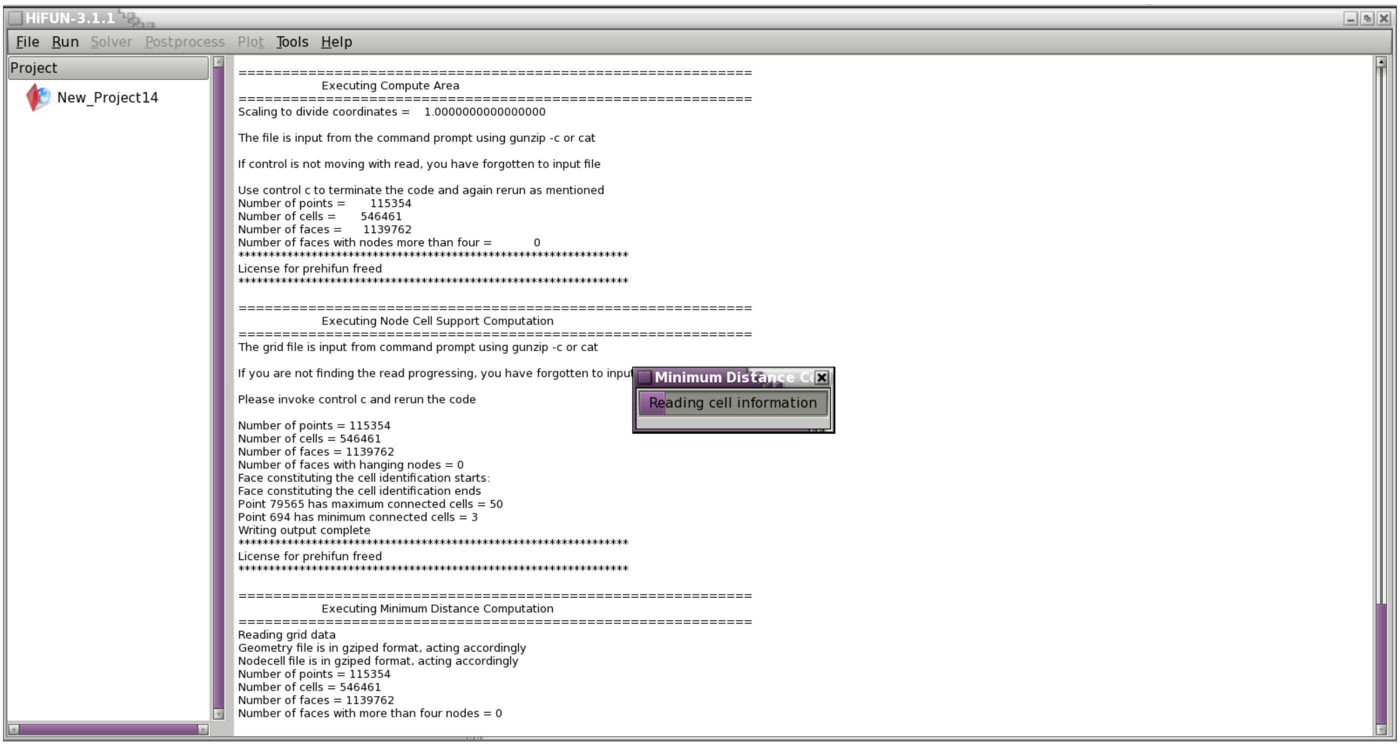
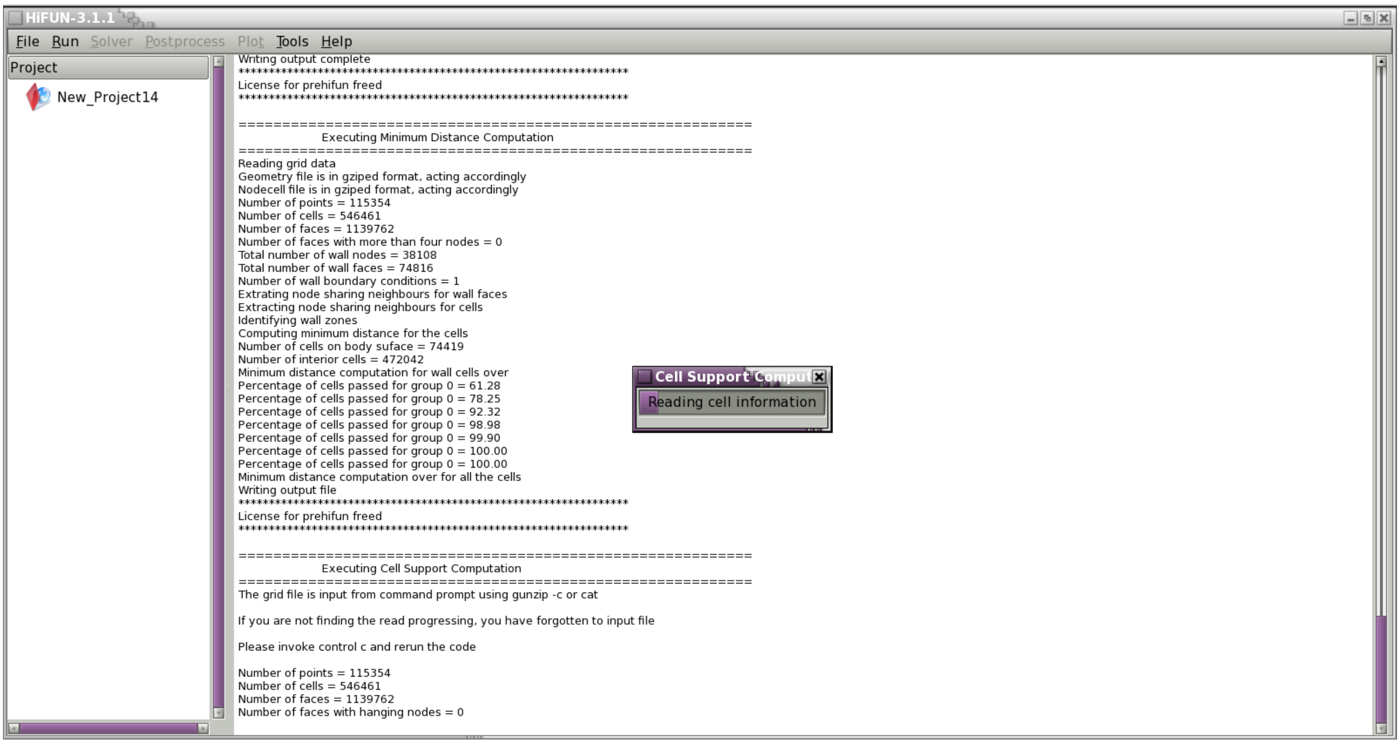


Cell connectivity computation: This step computes cell based connectivity required to construct graph.



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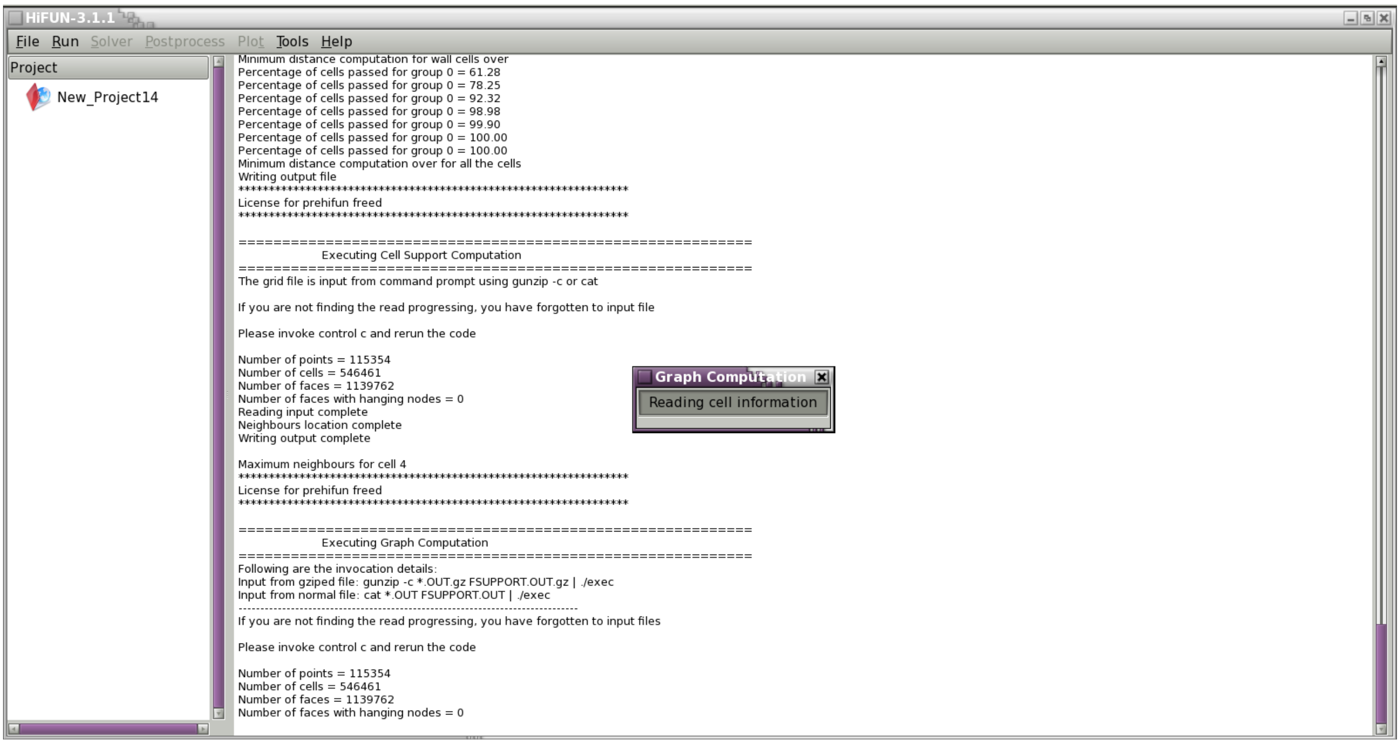
Graph computation: This step computes the graph required for domain decomposition.



After aforementioned step, first phase of preprocessing is over and a project ('New_Project14' in present case) will be created. The preprocessed grid data up till this stage may be stored and current project can be closed using **File->Close . T**he application can be exited using **File->Quit**. Note: Application window can not be closed unless user closes current project.

This project can be reopened using menu **File->Open.** (refer figure above)

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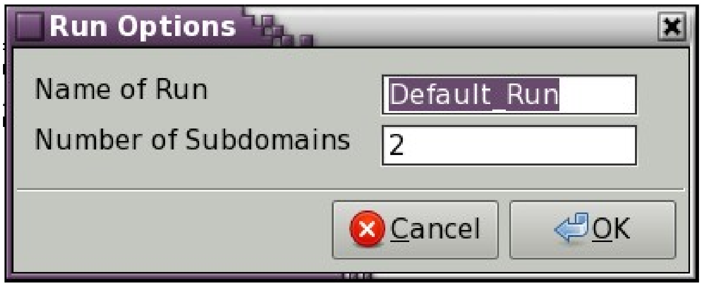
Run Menu:

Run menu is used to create a new run. A given project should have at least one run for solver to be executed. Each run has a unique name and associated number of subdomains.

To create a new run, select

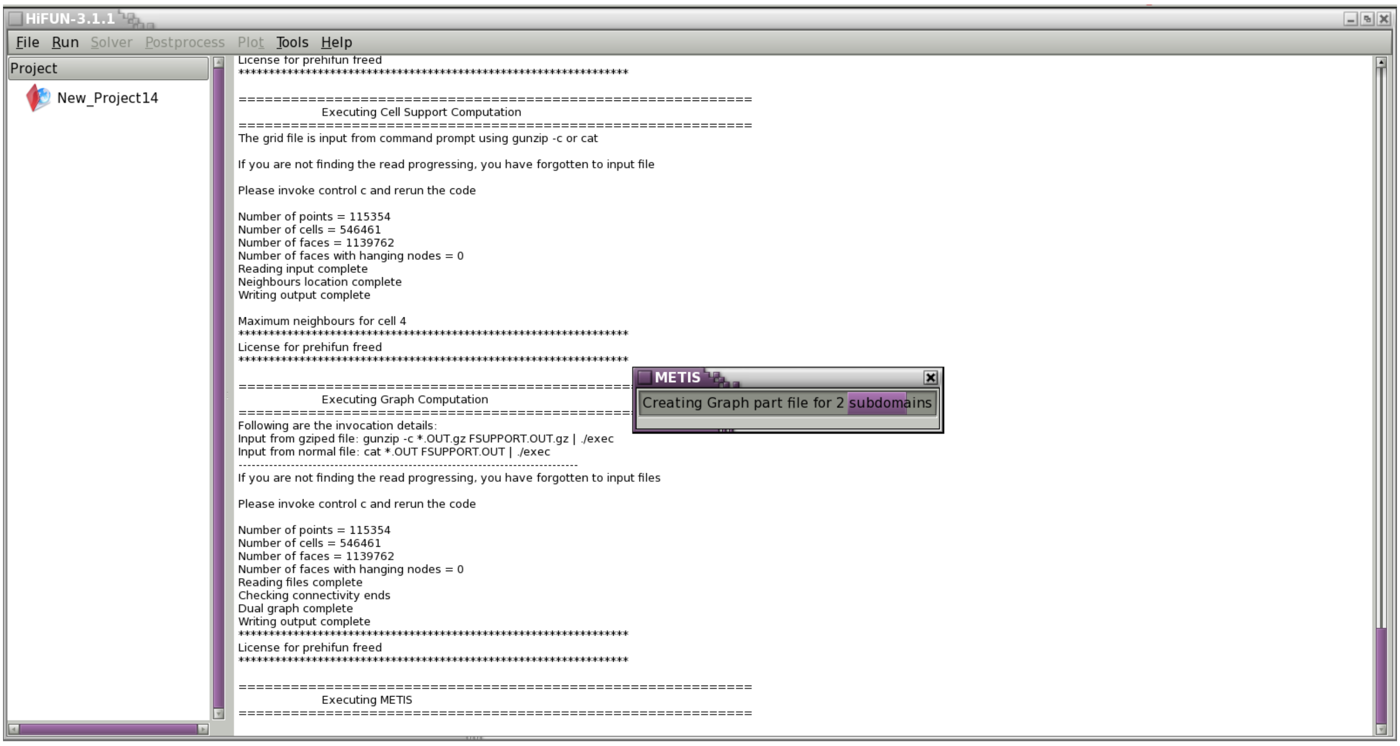
Run->New Run

Application will pop up a window to input run name and number of subdomains.



Once user inputs this information and clicks button 'OK', application will execute following two steps to prepare data for parallel run. (refer figure above)

MeTIS execution: This is a third party software used for domain decomposition. (refer figure below)



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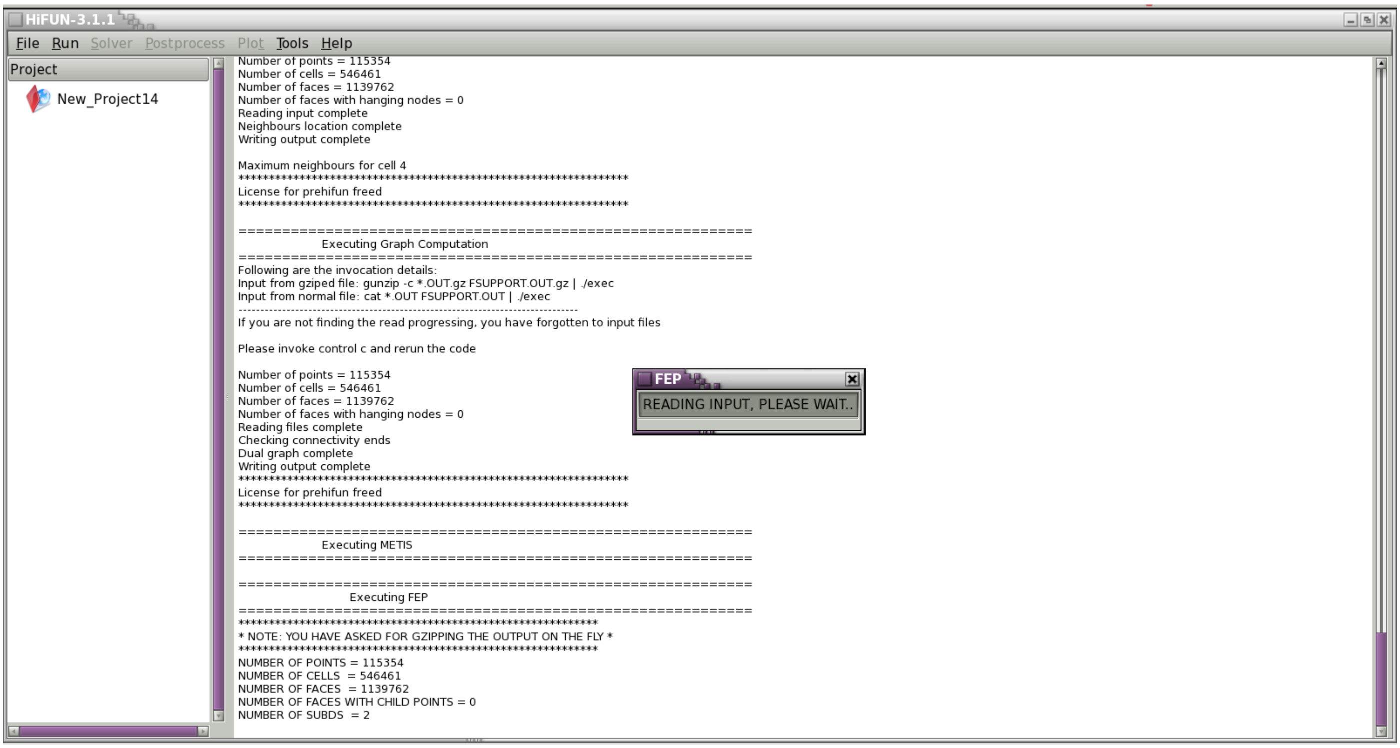
FEP execution: The Front End Program (FEP) decomposes preprocessed grid in as many parts as the number of subdomains. (refer figure below)



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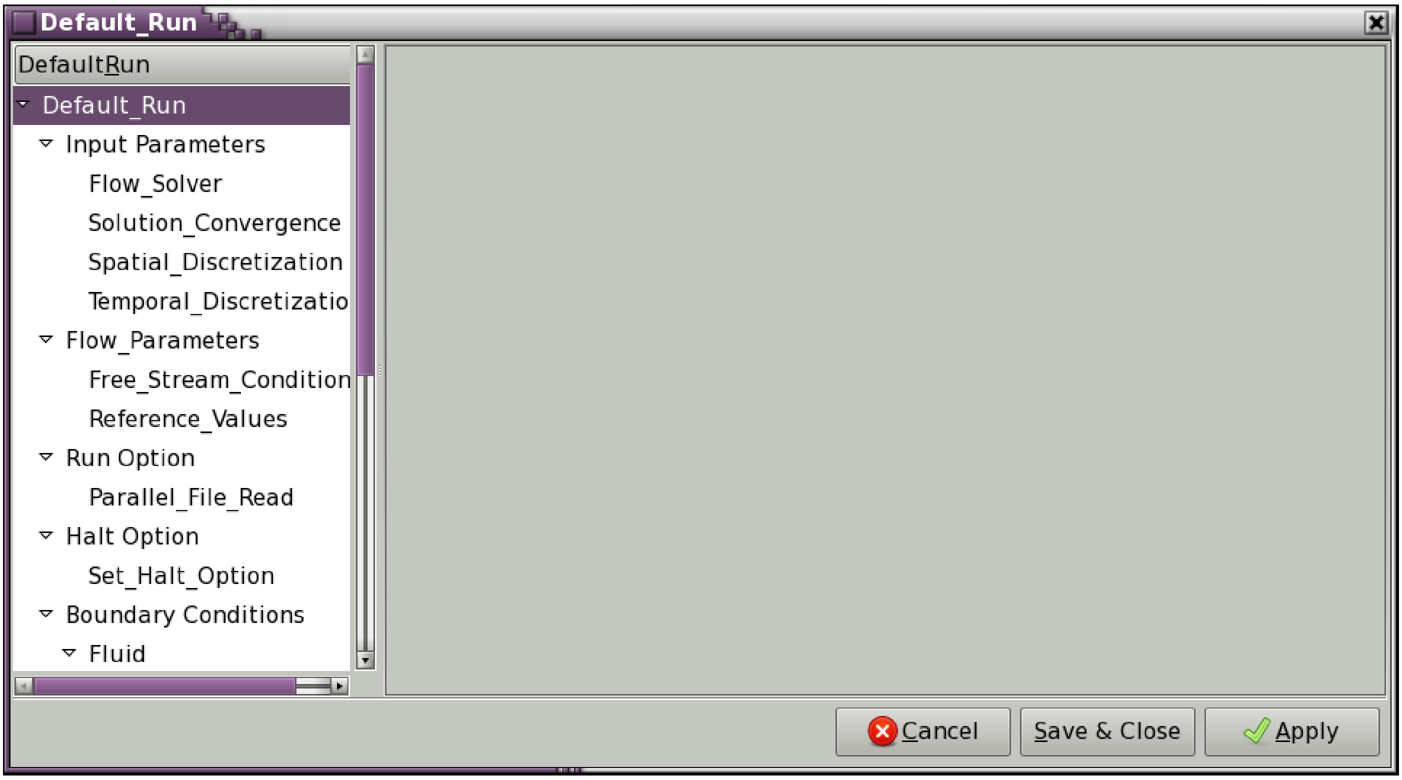
At the end of FEP execution, solver input dialog window for this run will pop out.



- In this dialog, user has to set values to different parameters required for executing the flow solver. These parameters are explained below:

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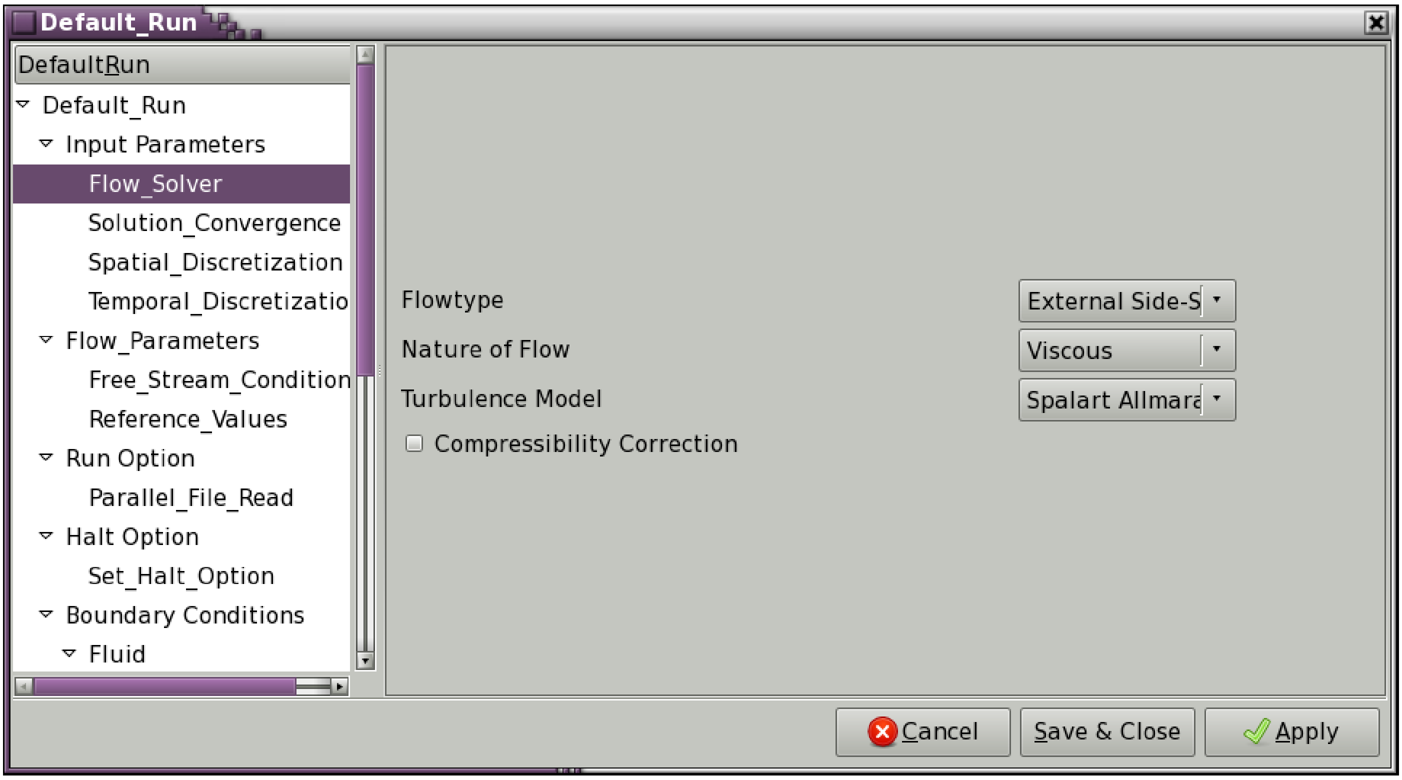
(1) Flow Solver



Parameter	Option	Comment
Flowtype	External Side-Slip	For external flow computations with given angle of attack and side slip angle
	Internal	For internal flow computations
	External Roll	For external flow computations with given angle of attack and roll angle about longitudinal axis of configuration
Nature of Flow	Inviscid	For inviscid flow simulations
	Viscous	For viscous flow (Laminar or turbulent) simulations
Turbulence model	None	This option is visible only if Nature of Flow is set to Viscous.
	Spalart Allmaras	
	K-OMEGA SST	
	K-OMEGA TNT	
Compressibility correction	Tick / untick	This option is visible if Turbulence model is set to Spalart Allmaras. Tick this option if the geometry has large base.

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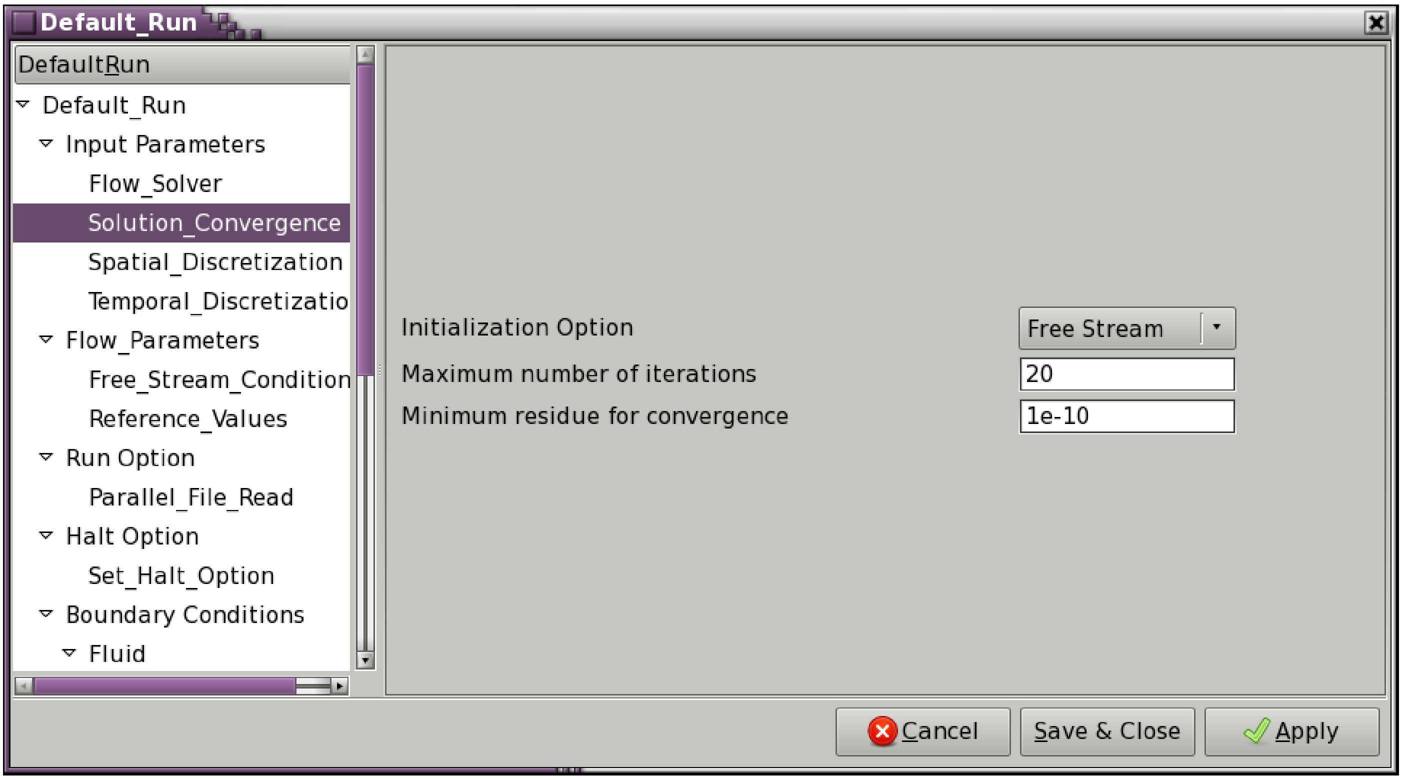
(2) Solution convergence



Parameter	Option	Comments
Initialization Option	Free stream Init-Restart Restart Special Restart	
Maximum number of iterations	<integer number>	
Minimum residue for convergence	<float number>	

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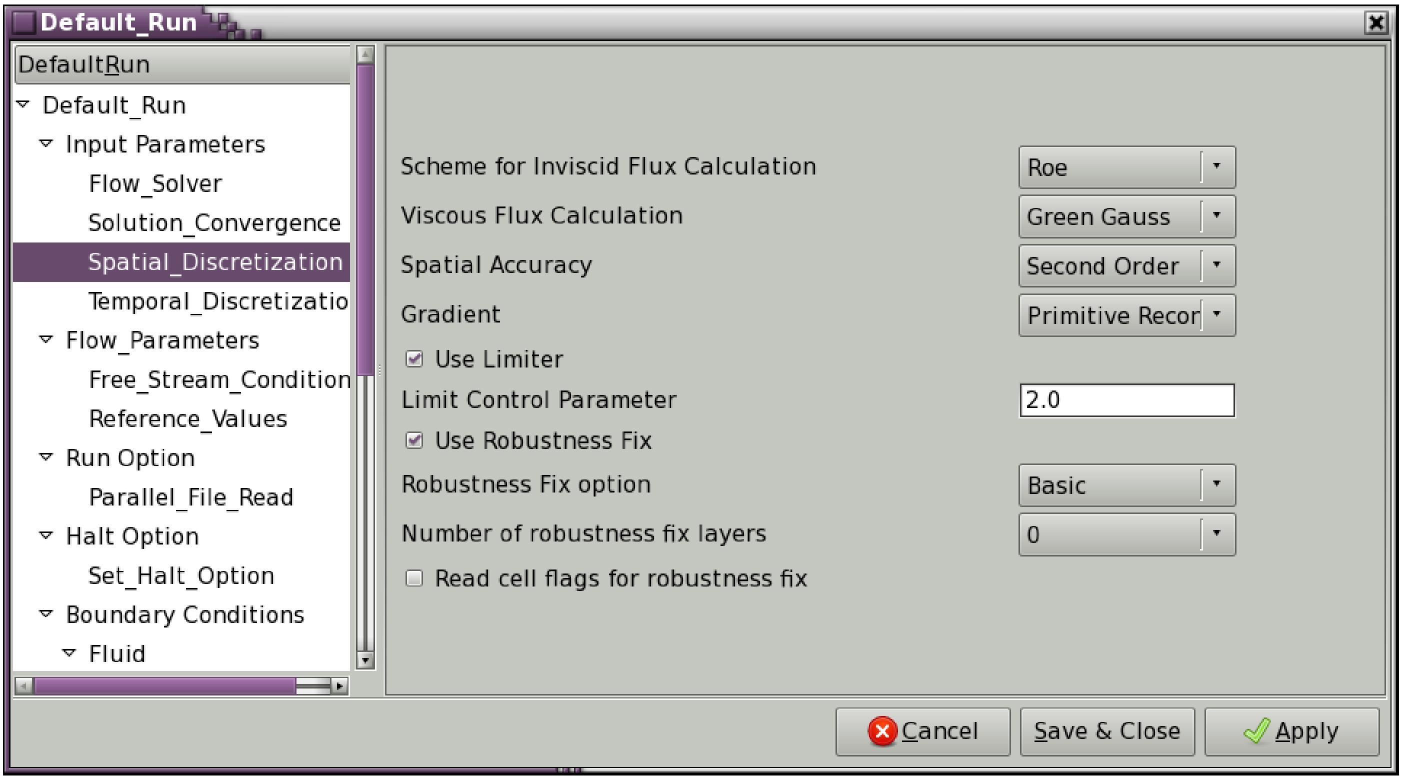
(3) Spatial discretization



Parameter	Option	Comment
Scheme for inviscid Flux Calculation	Various	
Viscous Flux Calculation	Green Gauss	
Spatial Accuracy	First Order	
	Second Order	
Gradient	Primitive reconstruction	This option is visible only if Spatial Accuracy is set to 'Second Order'
Use Limiter	Tick / untick	This option is visible only if Spatial Accuracy is set to 'Second Order'
Limit control parameter	Float value	This option is visible only if Spatial Accuracy is set to 'Second Order'
Use robustness fix	Tick / untick	Switches on/off robustness fix for stiff problems

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Parameter	Option	Comment
Robustness Fix Option	Basic	
	Advanced	
Number of robustness fix layers	Various	
Read cell flags for robustness fix	Tick / untick	

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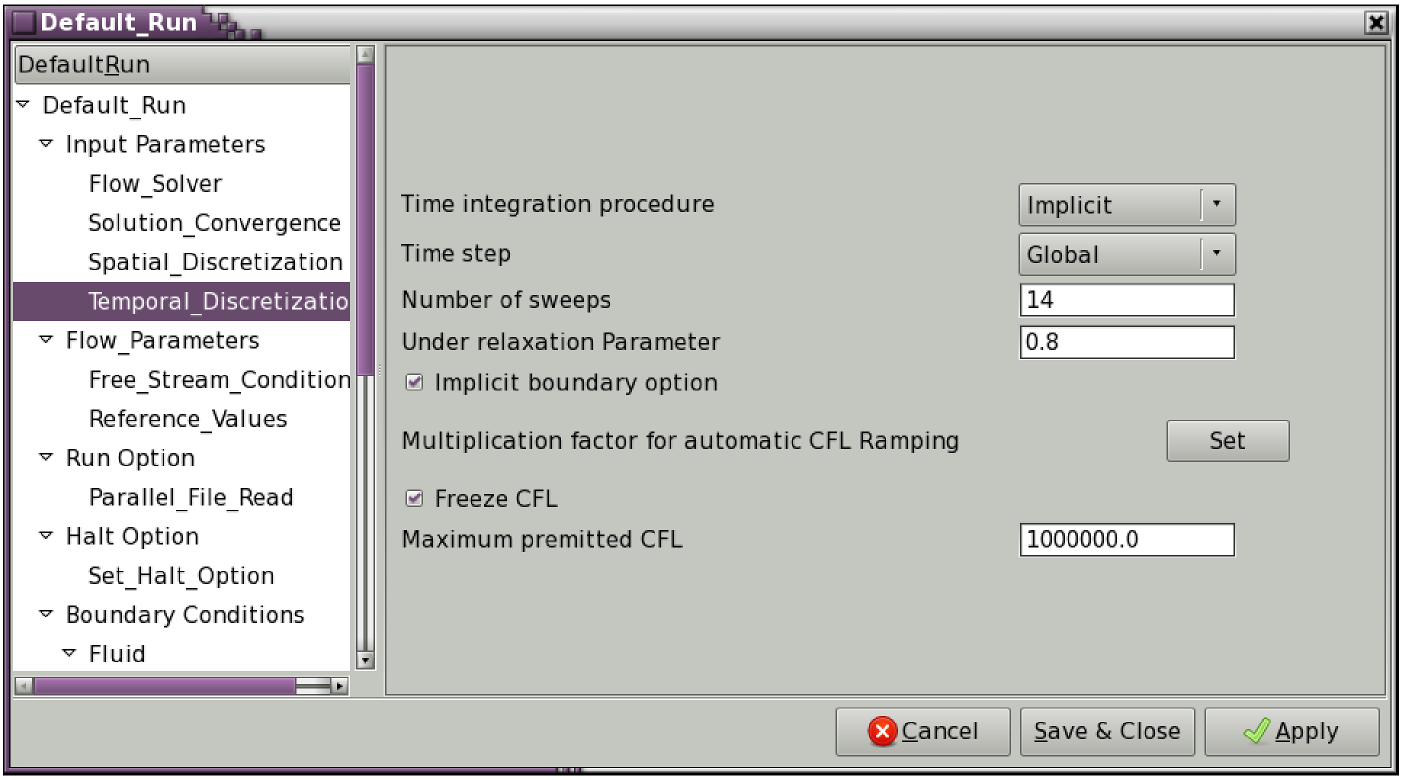
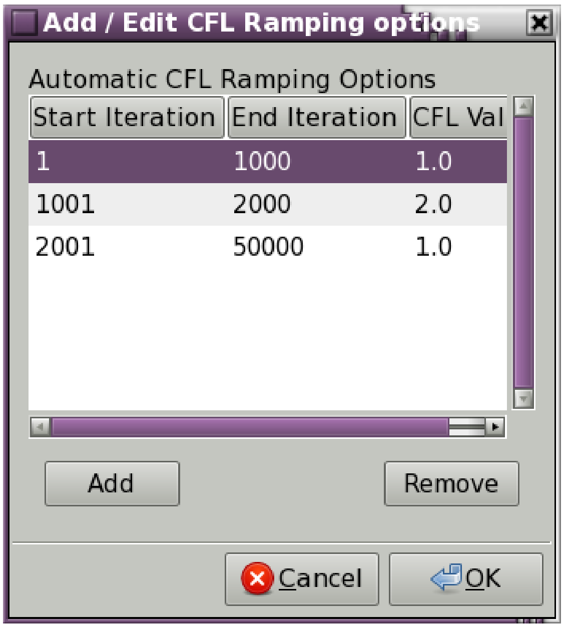
(4) Temporal discretization





Parameter	Option	Comment
Time integration procedure	Implicit	Implicit scheme employs Symmetric Gauss Seidel (SGS) matrix free relaxation procedure
	Explicit	

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Parameter	Option	Comment
Time step	Global	
	Local	
Number of sweeps	<integer number>	Required for implicit time integration, typically 10
Under-relaxation parameter	<Float number> <= 1.0	Used for SGS procedure
Implicit boundary option	Tick / untick	Tick to switch on implicit boundary treatment during implicit time integration.
Multiplication factor for automatic CFL ramping	<Button>	Used in implicit procedure, CFL = iteration times CFL multiplying factor. Click 'Set' button to add automatic CFL ramping options. (refer to figure above)
Freeze CFL	Tick / untick	Tick to freeze CFL number
Maximum permitted CFL	<Float number>	Upper limit for CFL number

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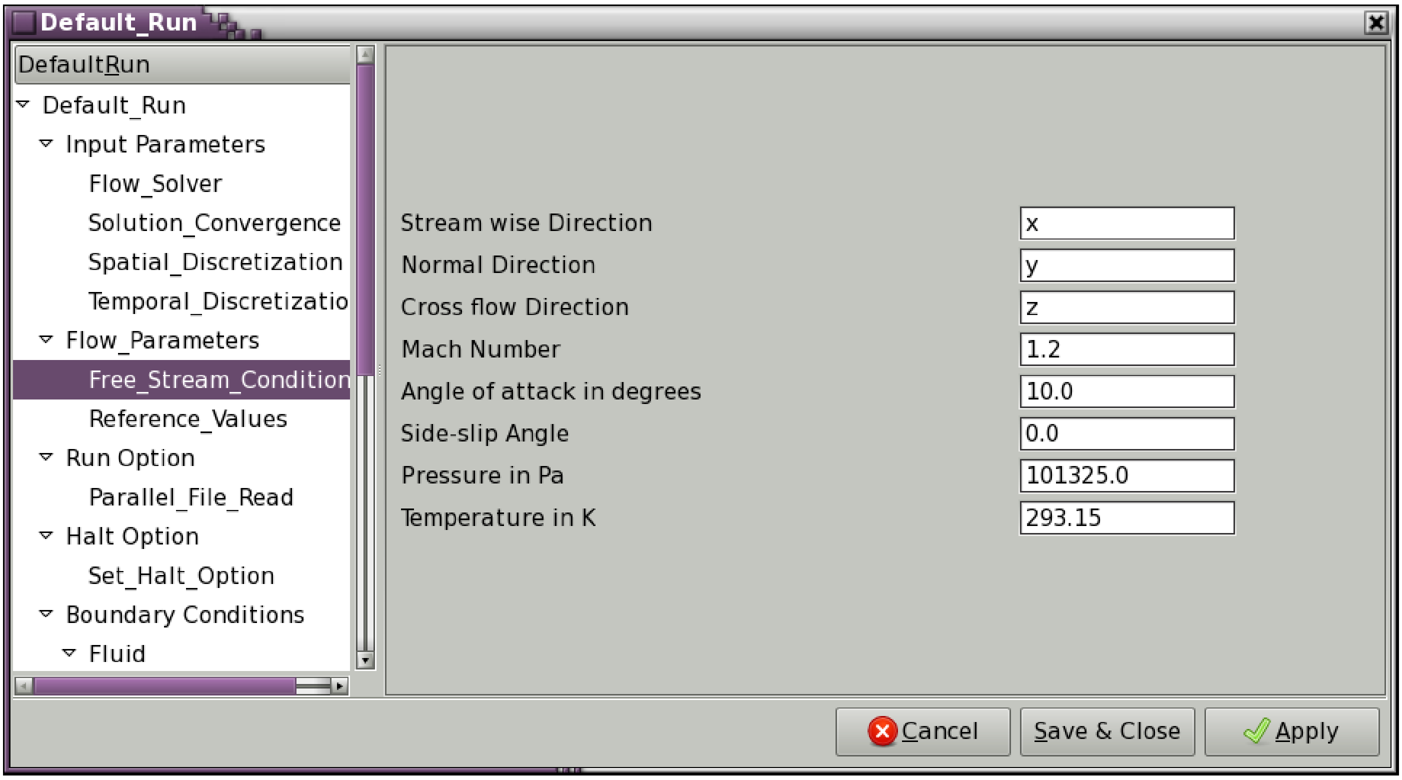
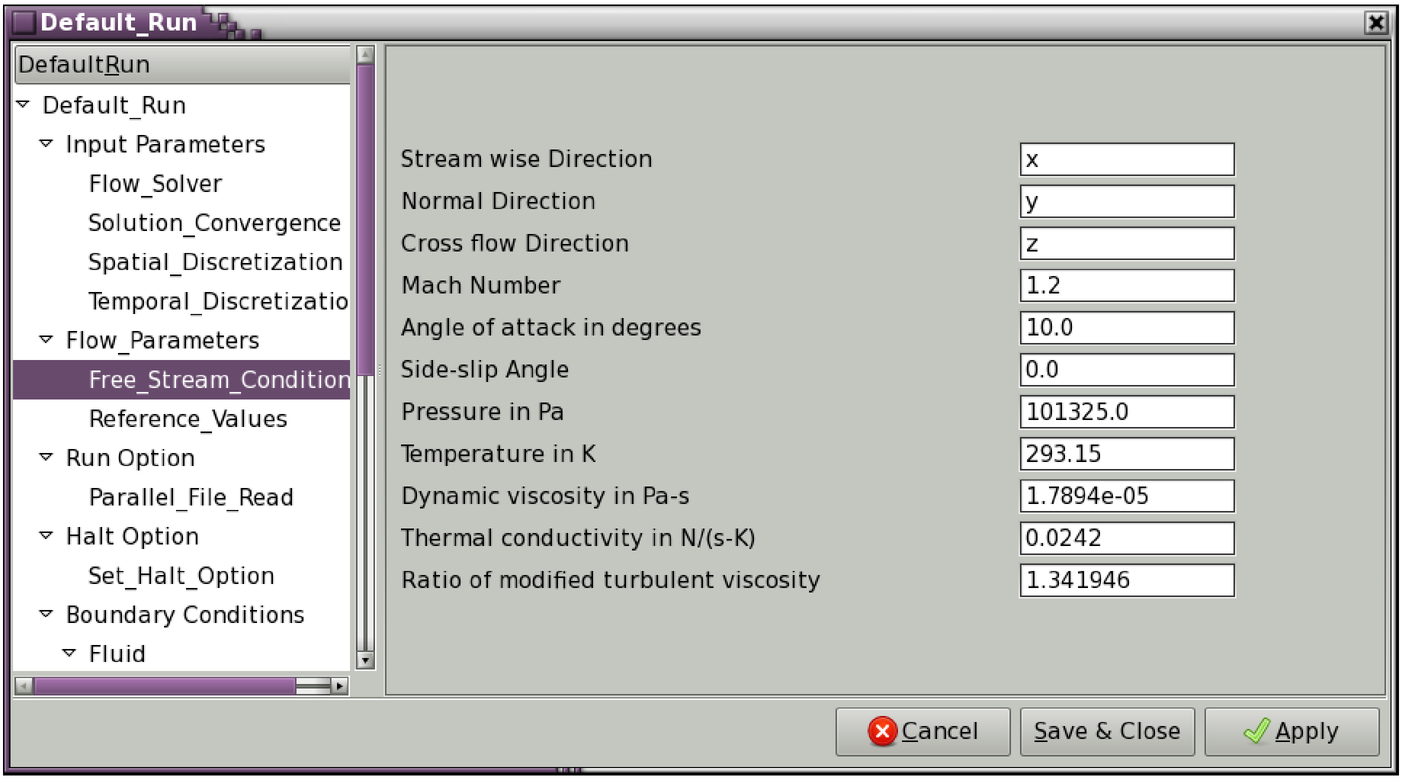
(5) Free stream conditions

(Nature of Flow == Inviscid)



(Nature of Flow == Viscous and Turbulence Model == Spalart Allamaras)



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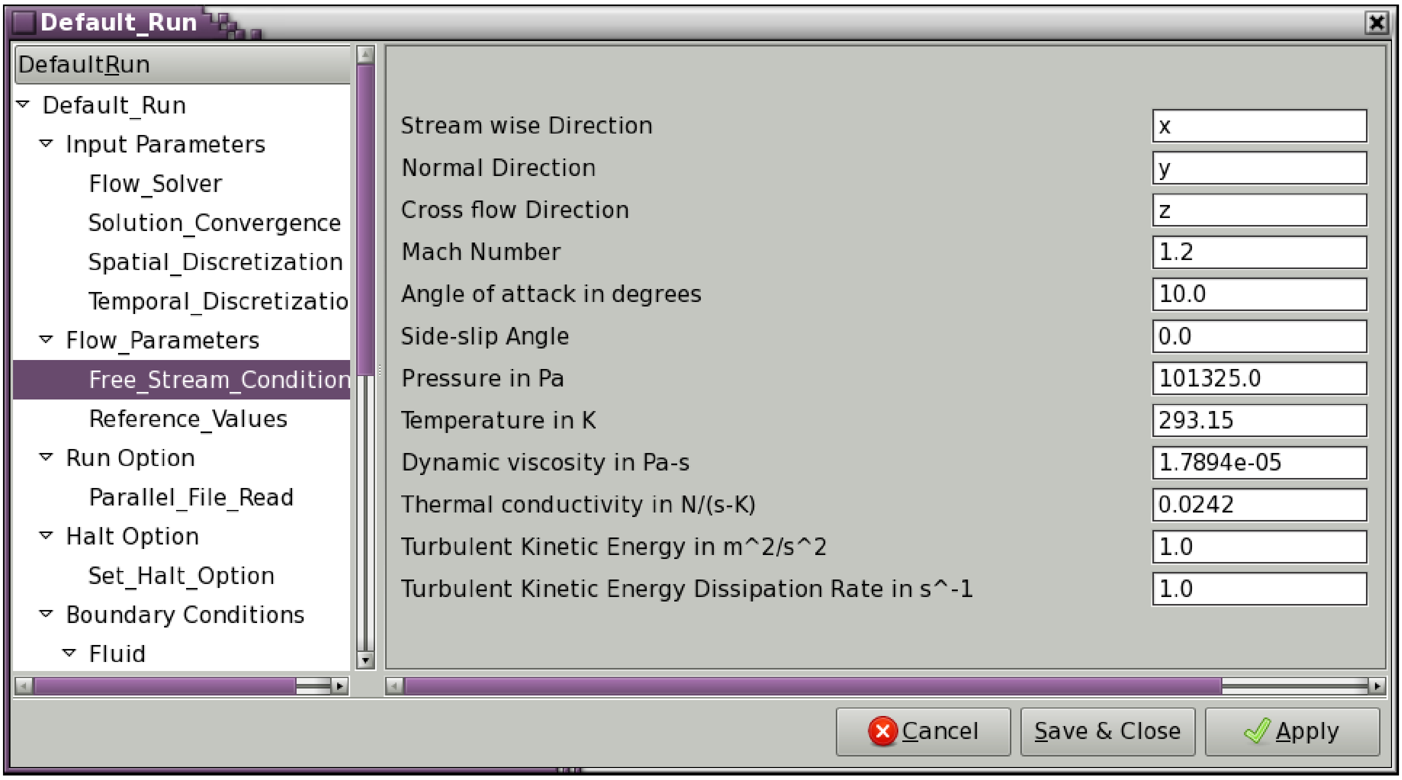
(Nature of Flow == Viscous and Turbulence Model == K-OMEGA SST/TNT)



Parameter	Option	Comment
Stream wise Direction	Character value : x / y / z	
Normal Direction	Character value : x / y / z	
Cross flow Direction	Character value : x / y / z	
Free stream Mach Number	<Float value>	
Angle of attack in degrees	<Float value>	
Side-slip angle in degrees	<Float value>	
Free stream Pressure in Pascals	<Float value>	
Free stream Temperature in Kelvins	<Float value>	
Free stream Dynamic	<Float value>	

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Parameter	Option	Comment
viscosity		
Free stream Thermal Conductivity	<Float value>	
Ratio of Modified Turbulent Viscosity	<Float value>	Ratio of free stream modified turbulent viscosity to free stream kinematic viscosity
Free stream Turbulent Kinetic Energy	<Float value>	
Free stream Turbulent Kinetic Energy Dissipation Rate	<Float value>	

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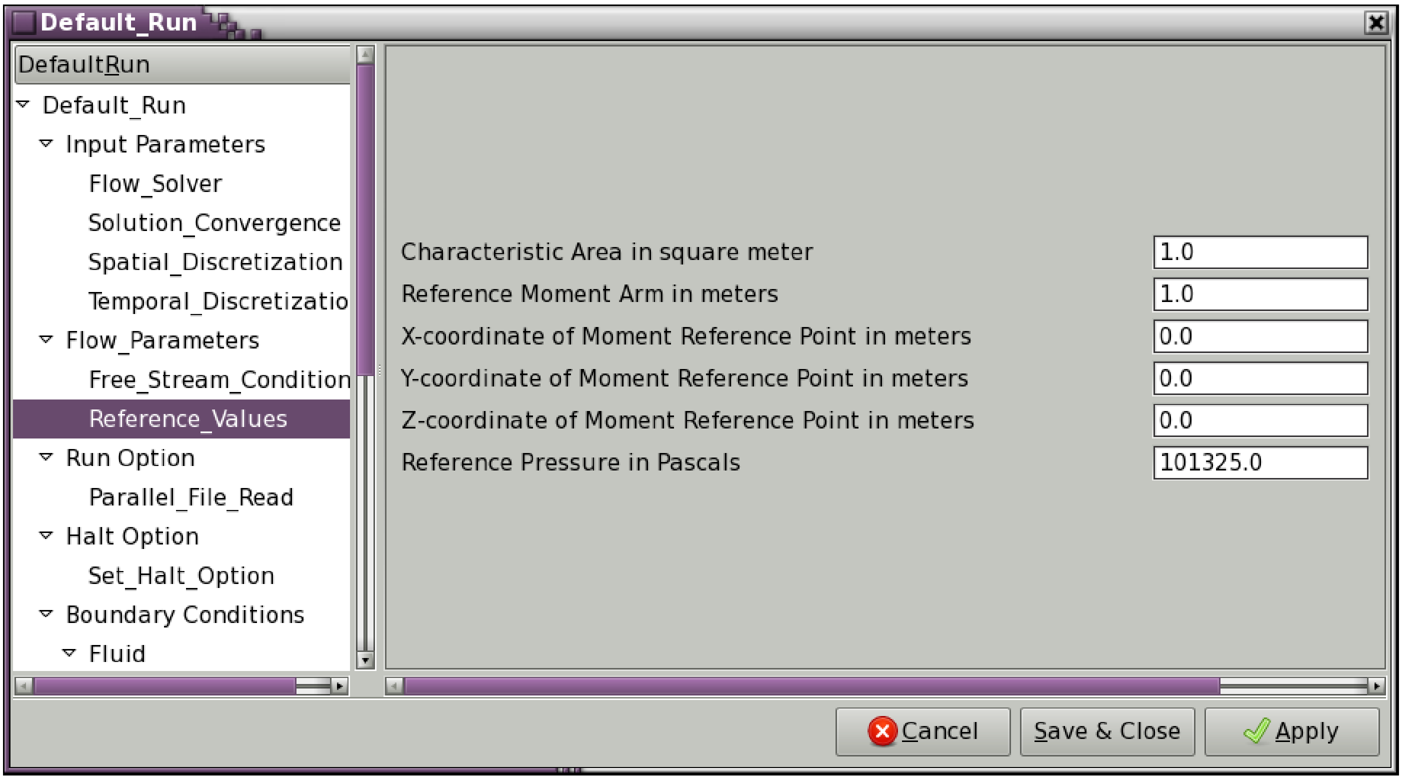
(6) Reference values



Parameter	Option	Comment
Characteristics Area in square meters	<Float value>	
Reference Moment Arm	<Float value>	
X-coordinate of Moment Reference Point	<Float value>	
Y-coordinate of Moment Reference Point	<Float value>	
Z-coordinate of Moment Reference Point	<Float value>	
Reference Pressure In Pascal	<Float value>	

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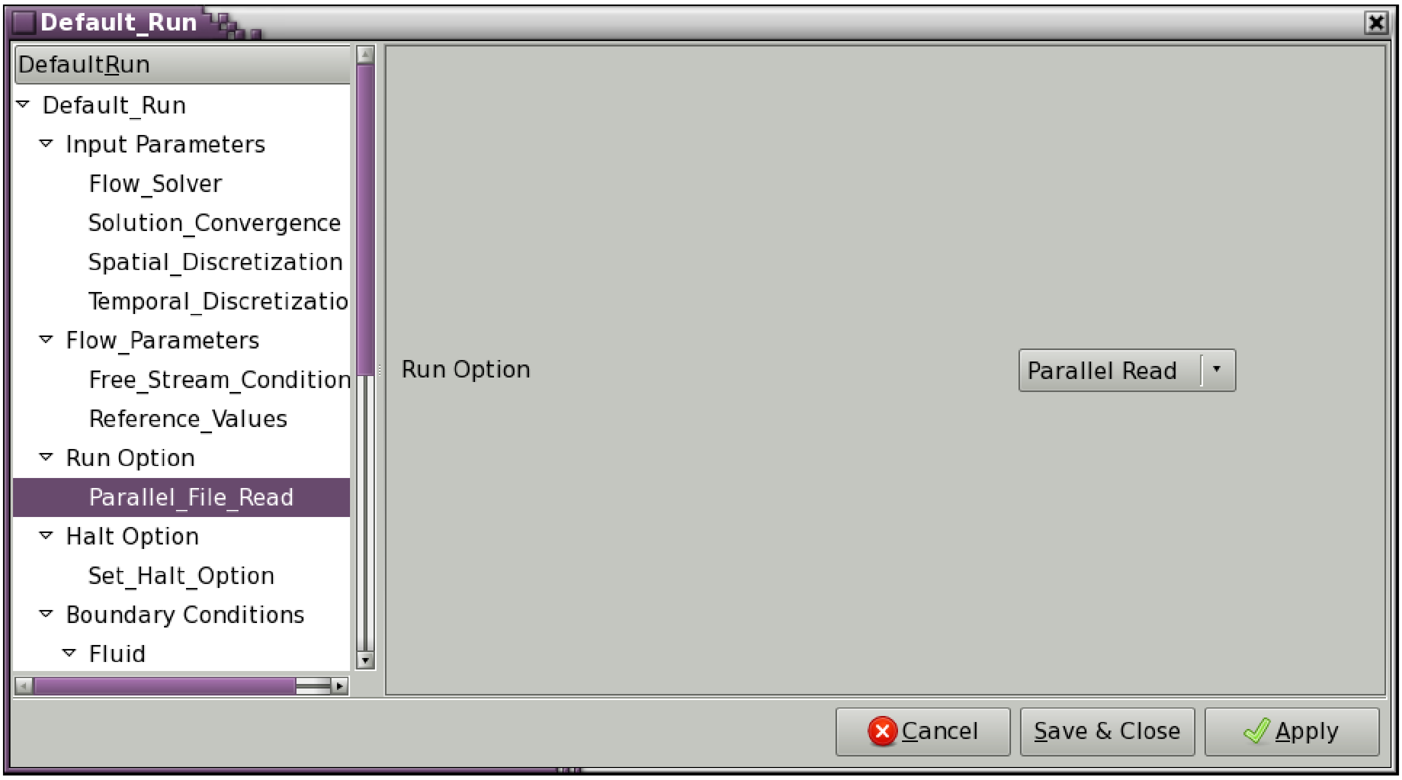
(7) Parallel file read



Parameter	Option	Comment
Run option	Parallel Read	Use option 'Parallel Read' by default
	Serial Read	

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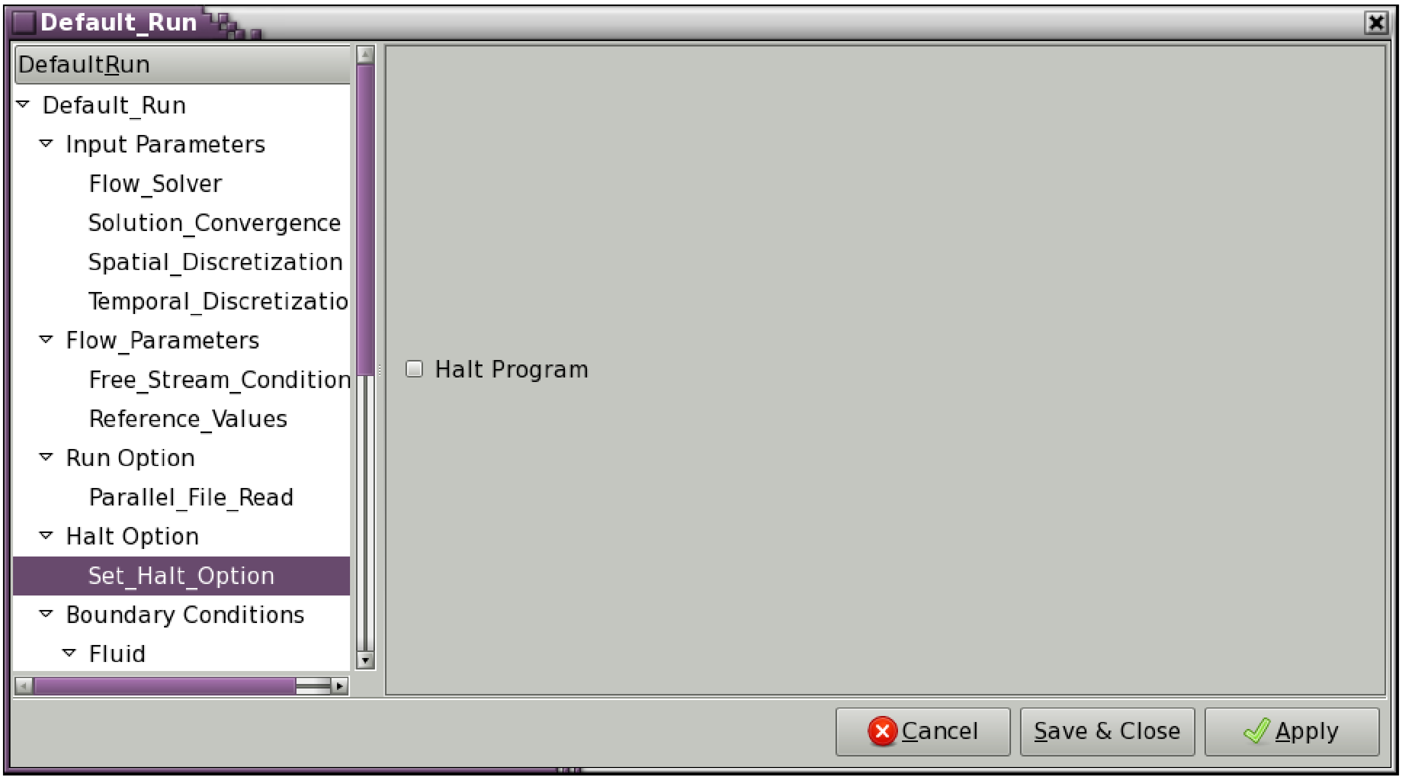
(8) Set halt option



Parameter	Option	Comment
Halt Program	Tick / untick	Tick this option to halt the solver run

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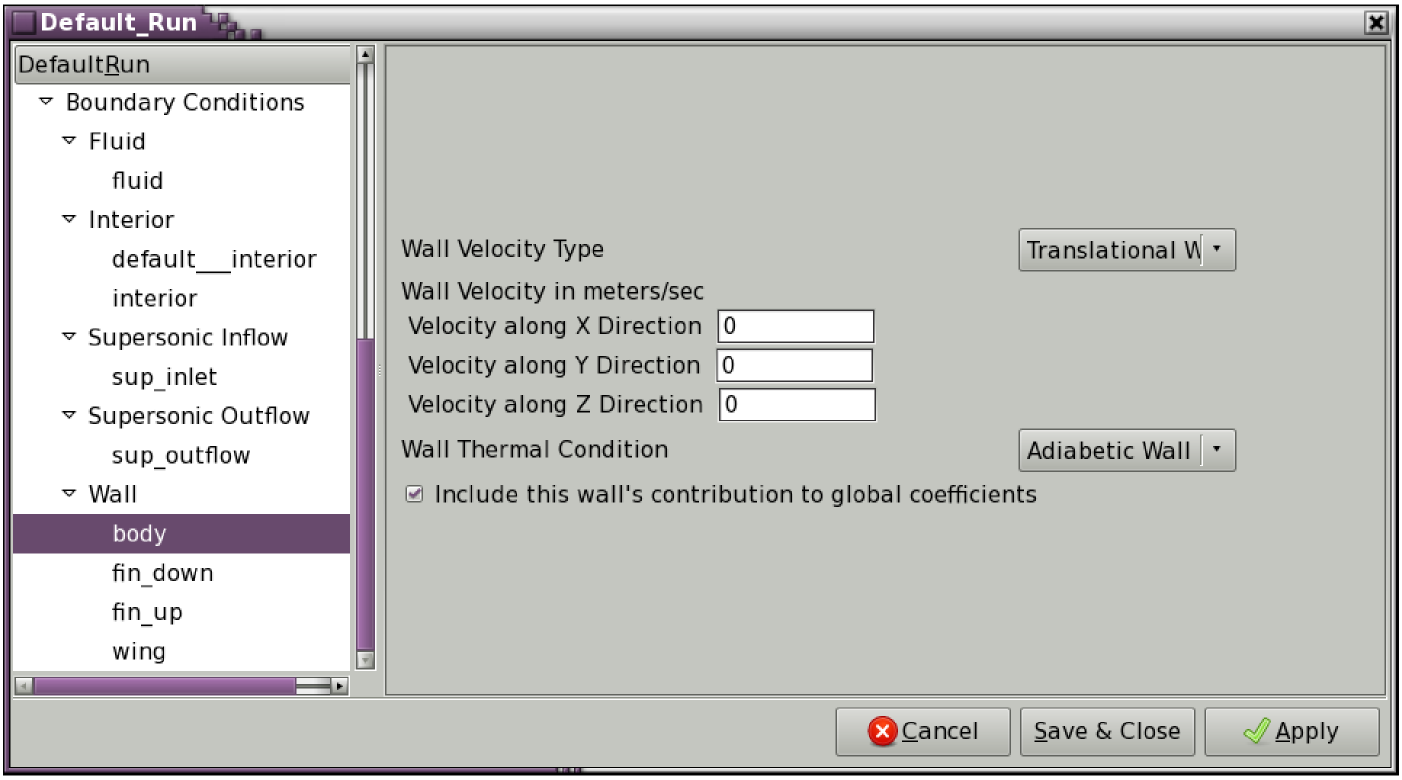
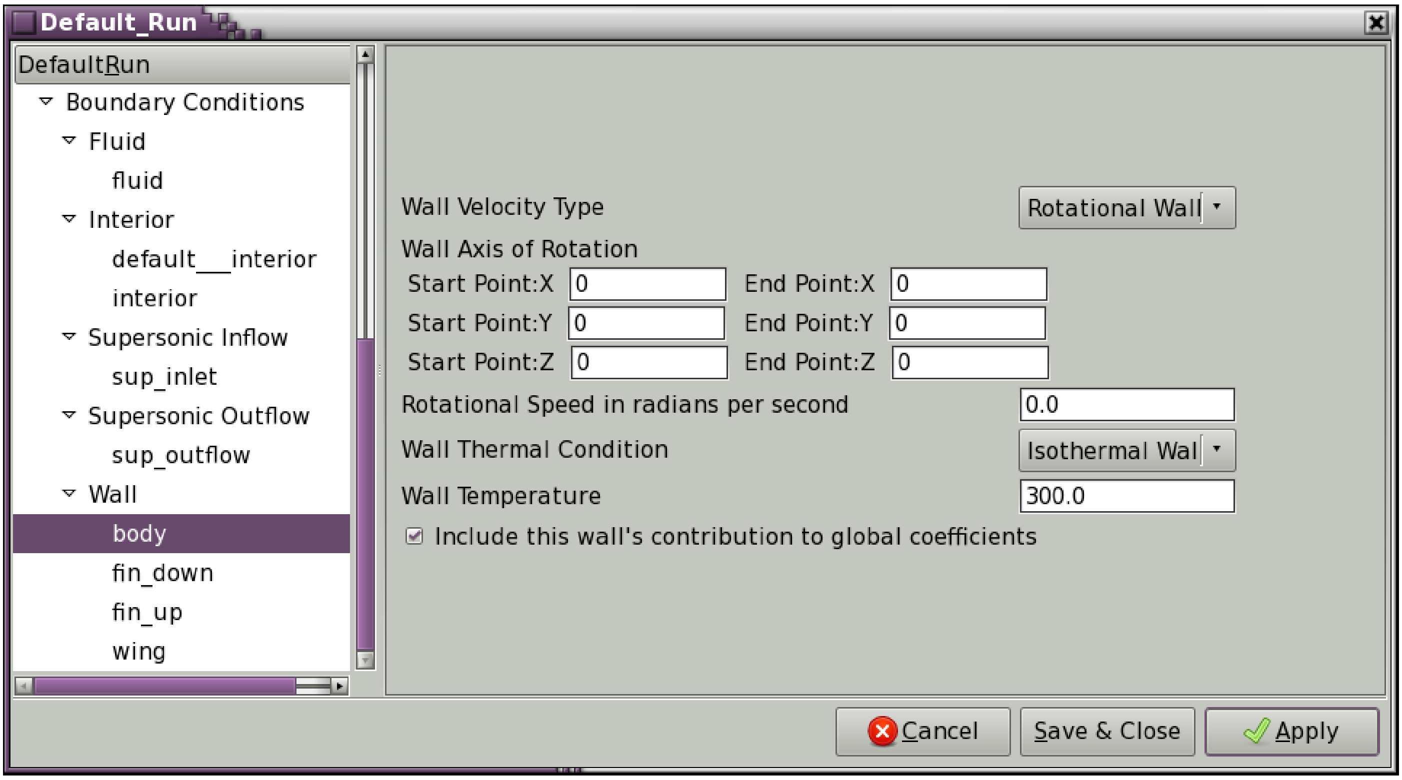
The boundary zones like Wall, Pressure Inlet and Pressure Outlet, Periodic as well as fluid zones require advanced parameters described below:

Wall Boundary Condition





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Parameter	Option	Comment
Wall Velocity Type	Translational Wall	
	Rotational Wall	
U Velocity	<Float value>	Set x component of velocity for translational wall boundary
V Velocity	<Float value>	Set y component of velocity for translational wall boundary
W Velocity	<Float value>	Set z component of velocity for translational wall boundary
Start point: X coordinate	<Float value>	X coordinate of starting point for axis of rotation in case of rotational wall boundary
Start point: Y coordinate	<Float value>	Y coordinate of starting point for axis of rotation in case of rotational wall boundary
Start point: Z coordinate	<Float value>	Z coordinate of starting point for axis of rotation in case of rotational wall boundary
End point: X coordinate	<Float value>	X coordinate of ending point for axis of rotation in case of rotational wall boundary
End point: Y coordinate	<Float value>	Y coordinate of ending point for axis of rotation in case of rotational wall boundary
End point: Z coordinate	<Float value>	Z coordinate of ending point for axis of rotation in case of rotational wall boundary
Rotational Speed	<Float value>	Specify rotational speed in case of rotational wall boundary
Wall Temperature	Adiabatic Wall	
	Isothermal Wall	
Isothermal wall temperature	<Float Value>	Specify constant wall temperature for isothermal wall boundary
Include this wall's contribution to global coefficient	Tick / untick	Tick this option if the contribution of computed force and moment coefficients is to be included in global coefficients computation.

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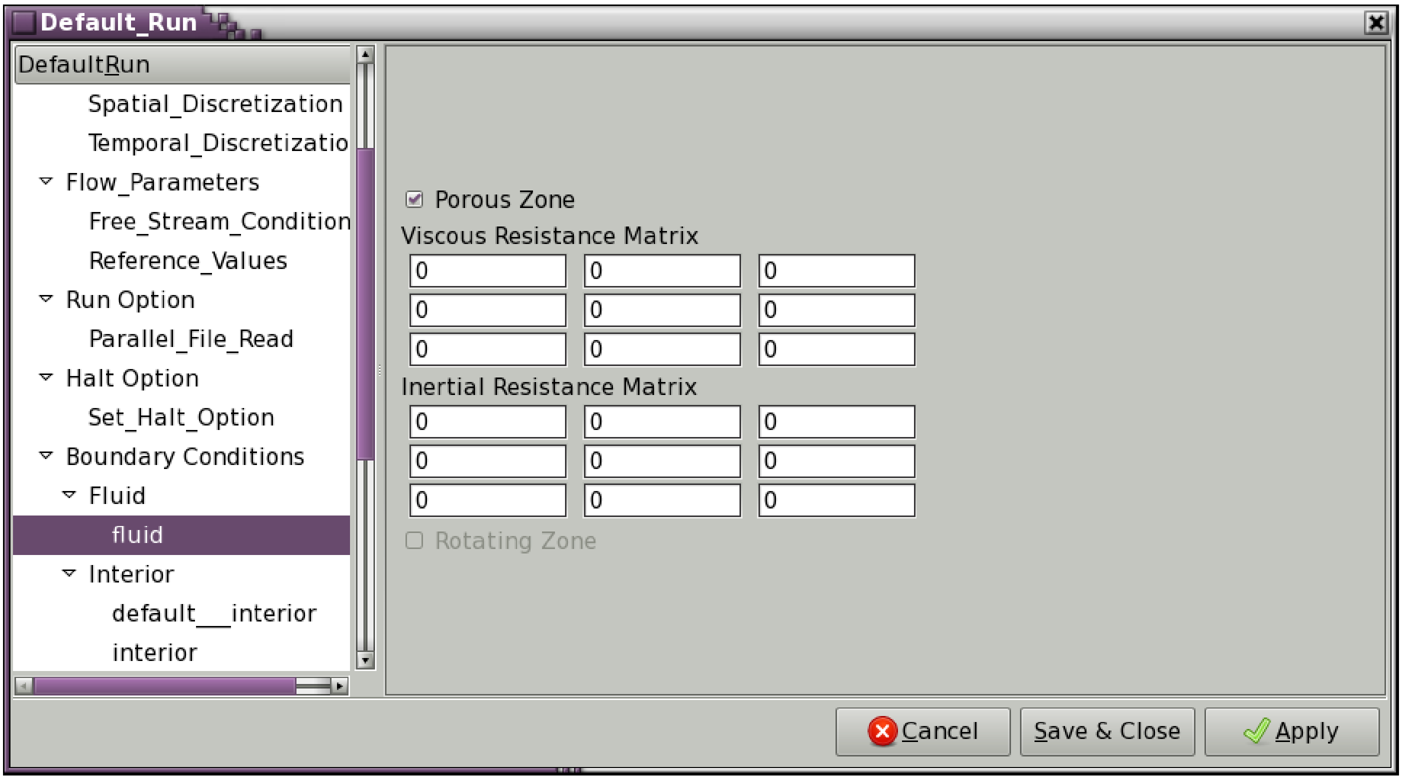
Fluid



Parameter	Option	Comment
Porous Zone	Tick / untick	Tick for specifying porous cell zone
Viscous Resistance Matrix	3 X 3 Matrix of floats	
Inertia Resistance Matrix	3 X 3 Matrix of floats	
Rotational Zone	Tick / untick	Tick to specify rotational zone to be treated using Rotating Frame of Reference Algorithm
Start point: X coordinate	<Float value>	X coordinate of starting point for axis of rotation for cell zone
Start point: Y coordinate	<Float value>	Y coordinate of starting point for axis of rotation for cell zone
Start point: Z coordinate	<Float value>	Z coordinate of starting point for axis of rotation for cell zone

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Parameter	Option	Comment
End point: X coordinate	<Float value>	X coordinate of ending point for axis of rotation for cell zone
End point: Y coordinate	<Float value>	Y coordinate of ending point for axis of rotation for cell zone
End point: Z coordinate	<Float value>	Z coordinate of ending point for axis of rotation for cell zone
Rotational Speed	<Float value>	Specify rotational speed for cell zone

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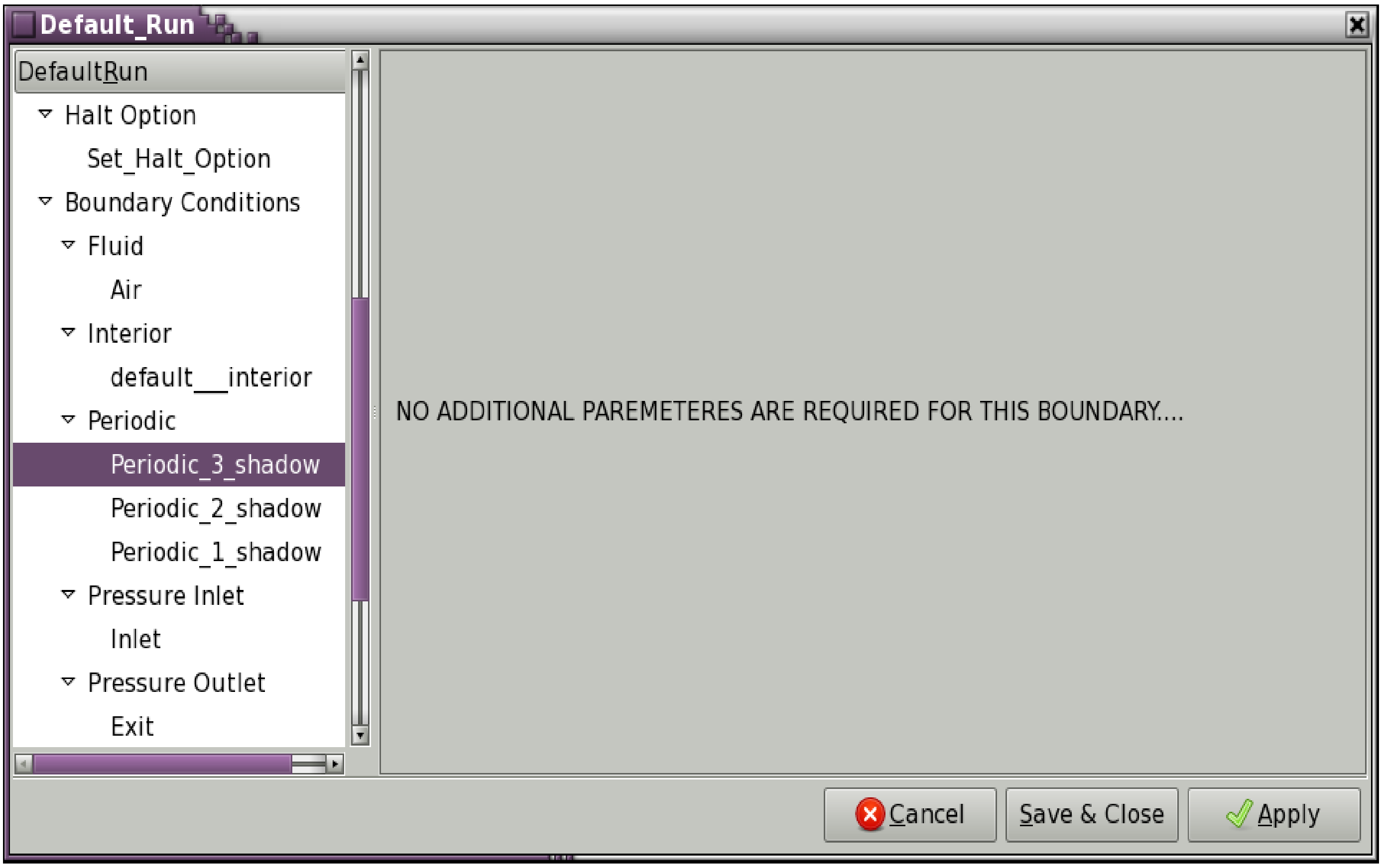
Periodic Boundary Condition

No additional parameters are required, if user selects Translational Periodicity while creating project.



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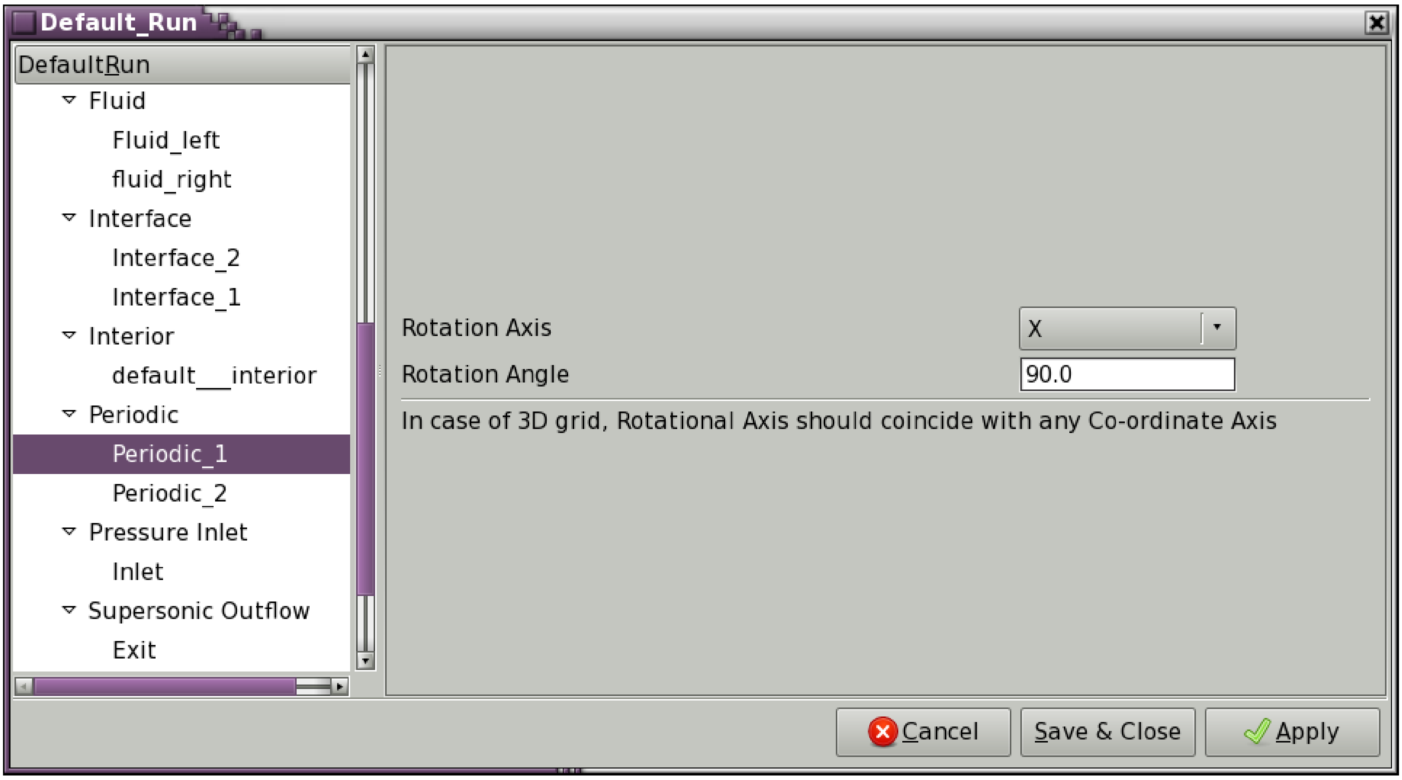
If user selects Rotational Periodicity while creating project.



Parameter	Option	Comment
Rotate Axis	X / Y / Z	
Rotate Angle	<Float value>	

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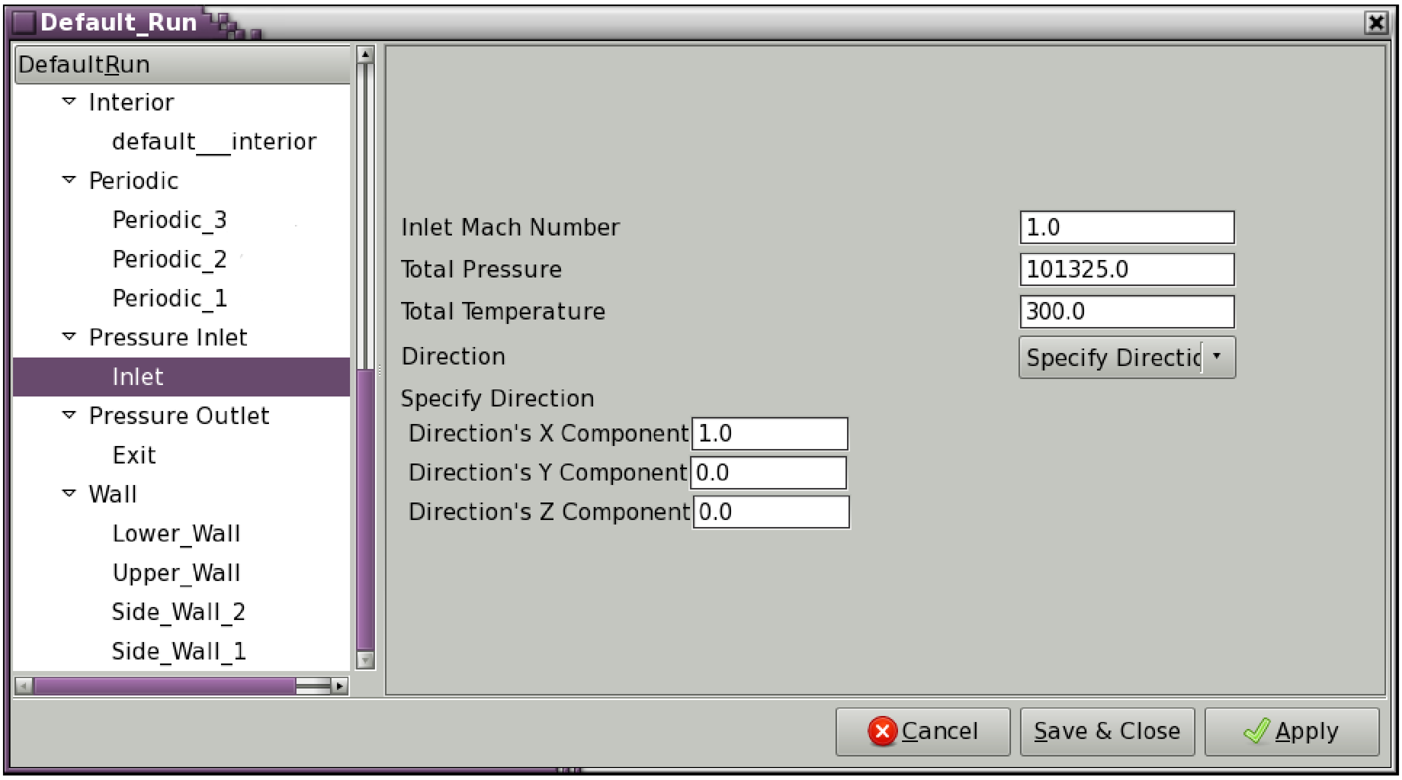
Pressure Inlet Boundary Condition



Parameter	Option	Comment
Inlet Mach Number	<Float value>	
Total Pressure	<Float value>	
Total Temperature	<Float value>	
Direction	Specify Direction	
	Normal to the boundary	
Direction's X Component	<Float value>	In case 'Specify Direction' option is used
Direction's Y Component	<Float value>	In case 'Specify Direction' option is used
Direction's Z Component	<Float value>	In case 'Specify Direction' option is used

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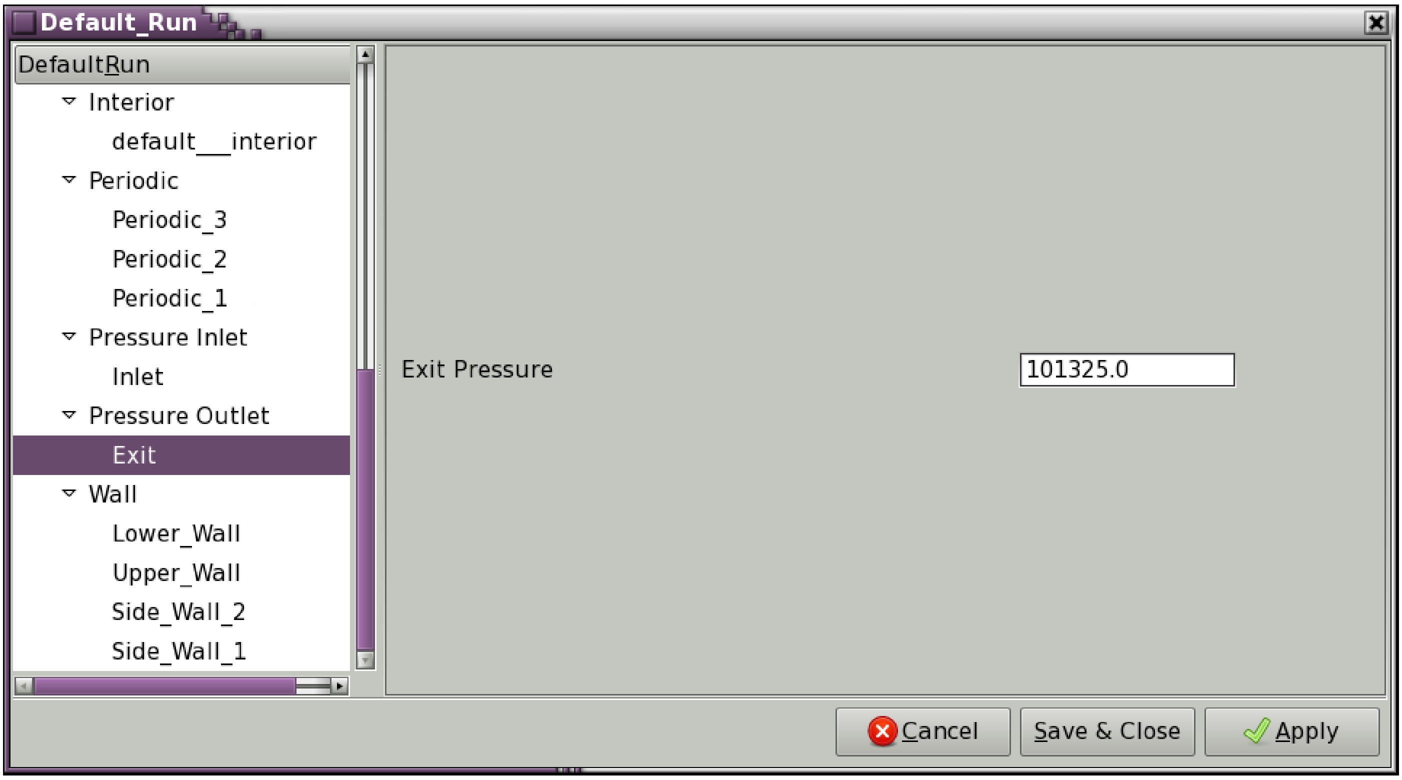
Pressure Outlet Boundary Condition



Parameter	Option	Comment
Exit Pressure	<Float value>	Back pressure to be used in case flow is subsonic at the boundary

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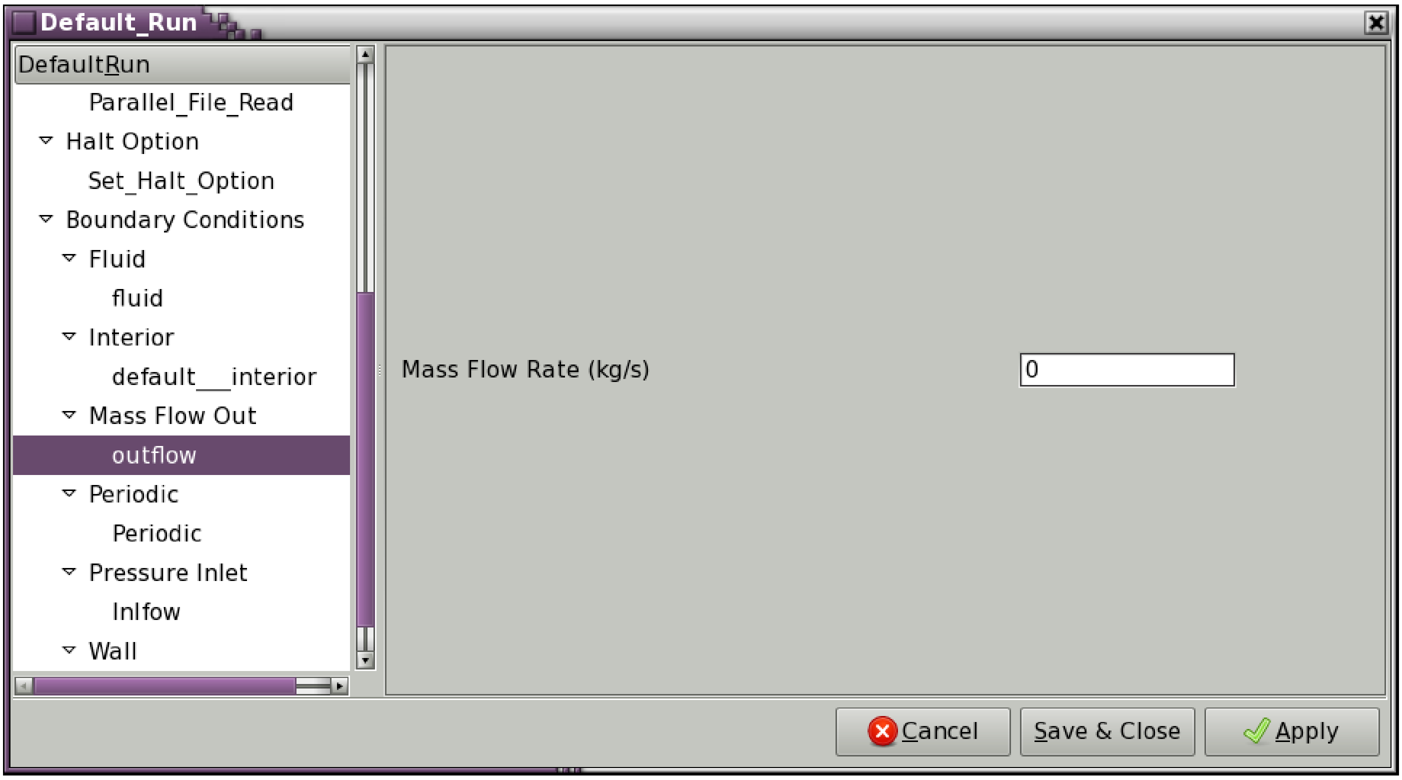
Mass Flow Outlet Boundary Condition



Parameter	Option	Comment
Mass Flow Rate (kg/s)	<Float value>	

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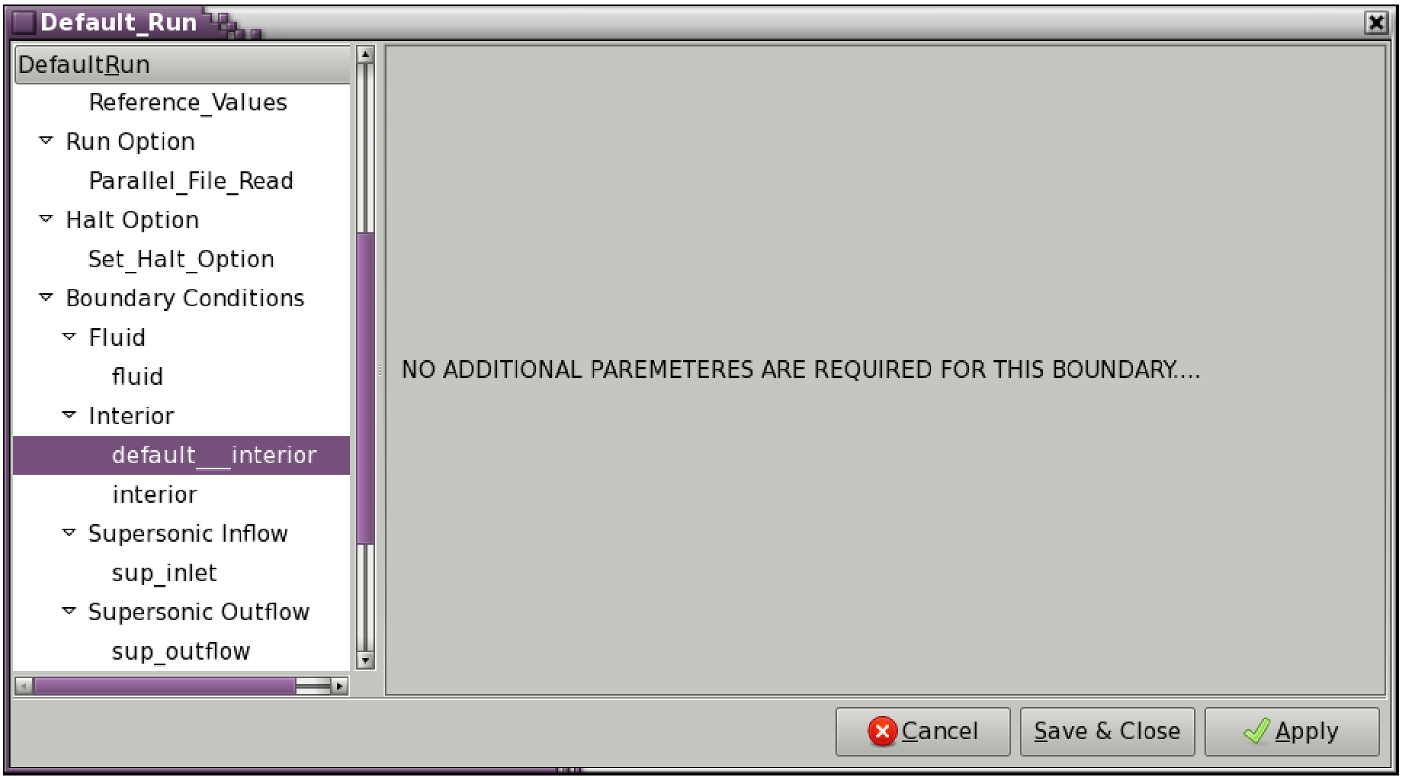
For other Boundary Conditions requiring no additional parameters, following label will be displayed**:**



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Run->Edit Active Run:

User can edit selected (active) run by selecting 'Run->Edit Active Run' menu. With this, aforementioned window will be opened.

Once the user modifies or changes on any page, click button 'Apply' to save the changes.

User can set default values for selected page by clicking the button 'Default' .

User can save and close Edit Run dialog by clicking 'Save & Close'. It will save all parameters in a required format fro solver execution.

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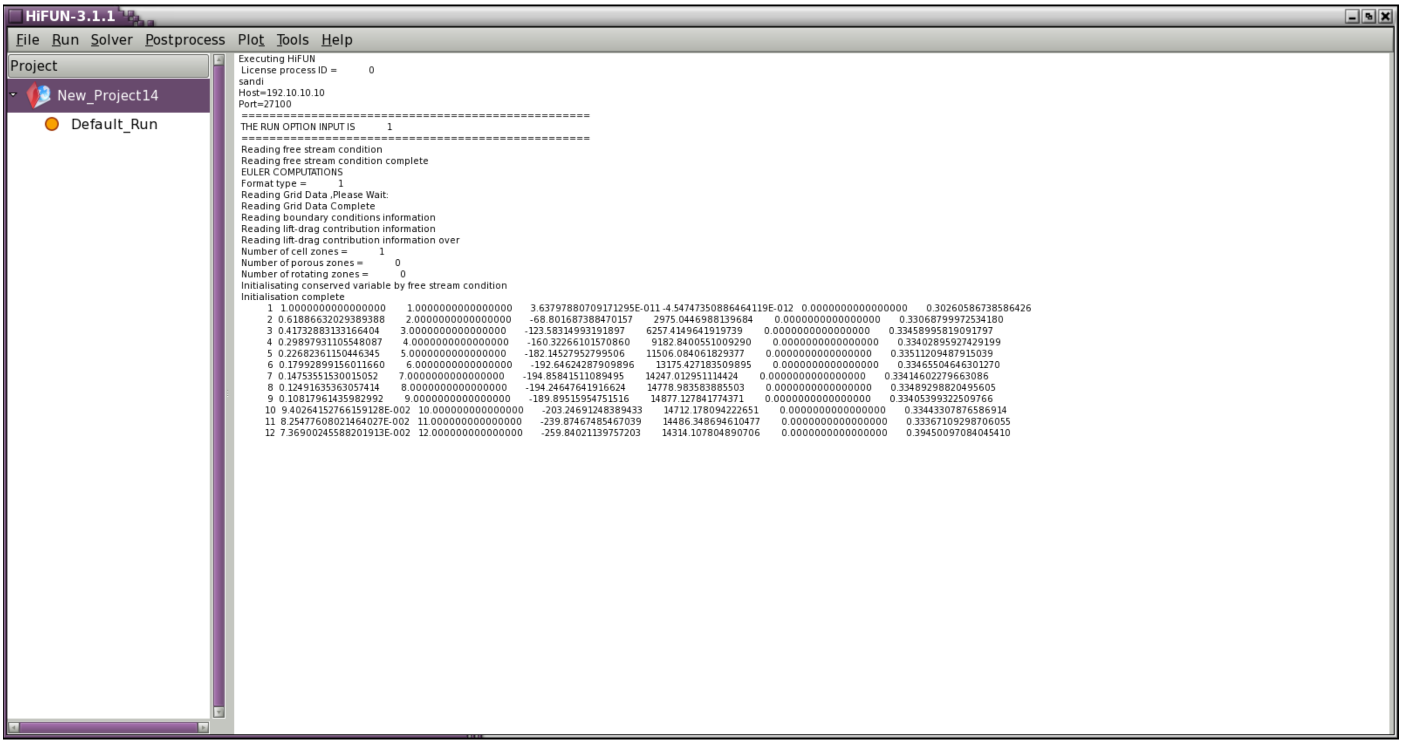
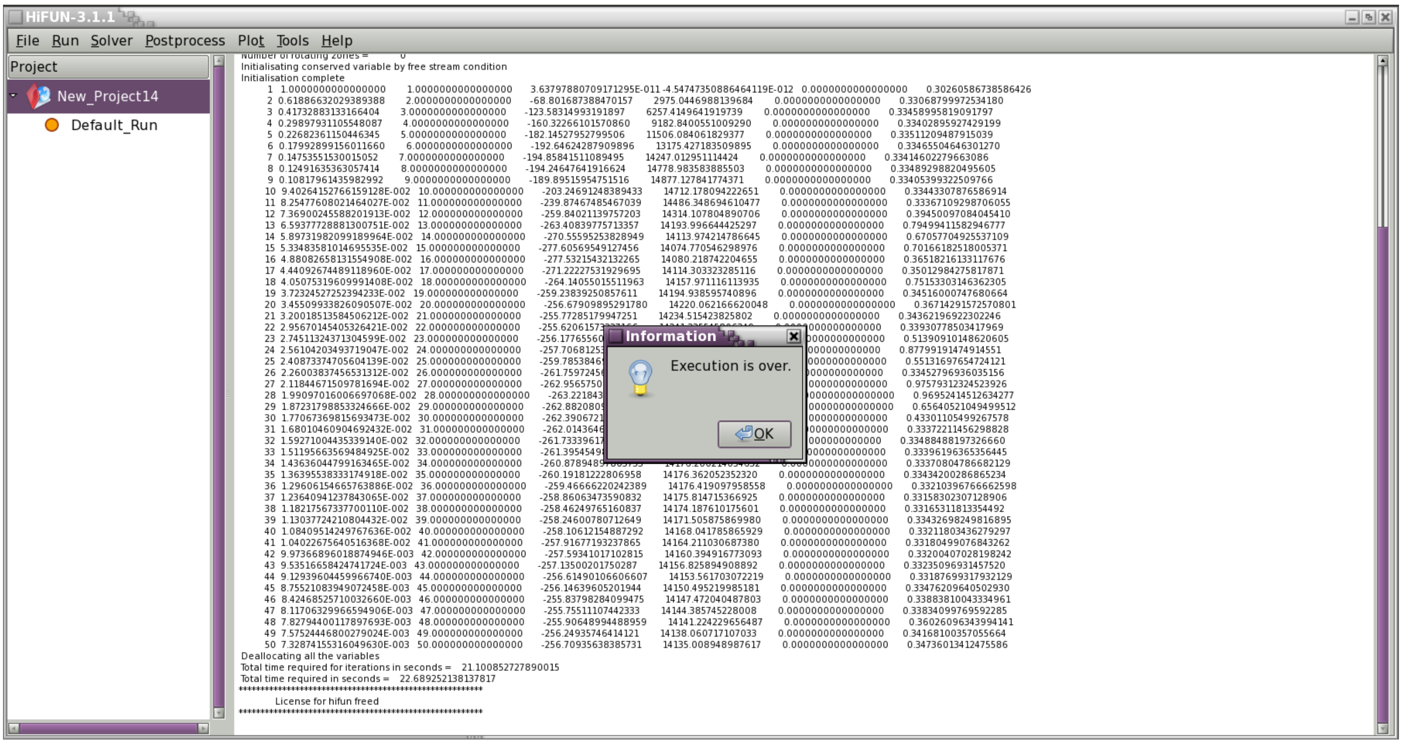
Solver Menu:

Solver menu has one submenu i.e. Execute.

Solver->Execute:

User can execute solver through GUI by clicking the sub-menu 'Execute'.





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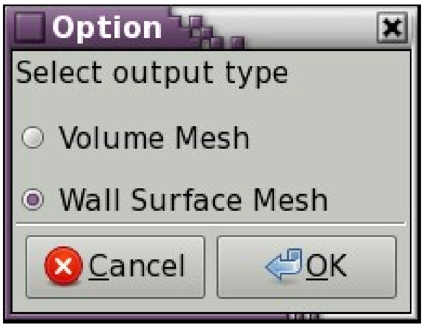
<u>Postprocess</u>:

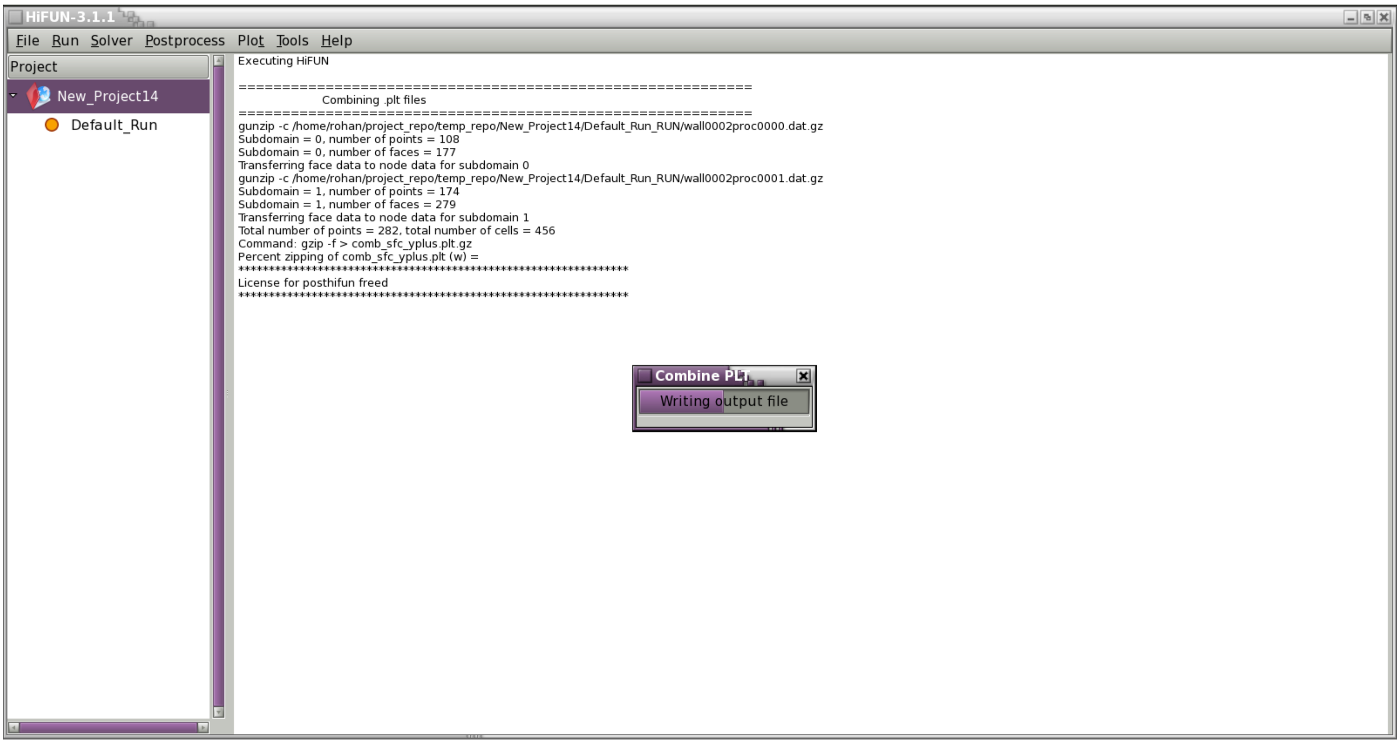
The menu Postprocess have a sub-menus 'Postprocess Data' and 'Show Wall Coefficients'

Postprocess->Postprocess Data:



By clicking the sub-menu 'Postprocess Data', an option window pops up. In this window, there are two options with the help of which user can write the volume data or wall surface data.

Option->Wall Surface Mesh:



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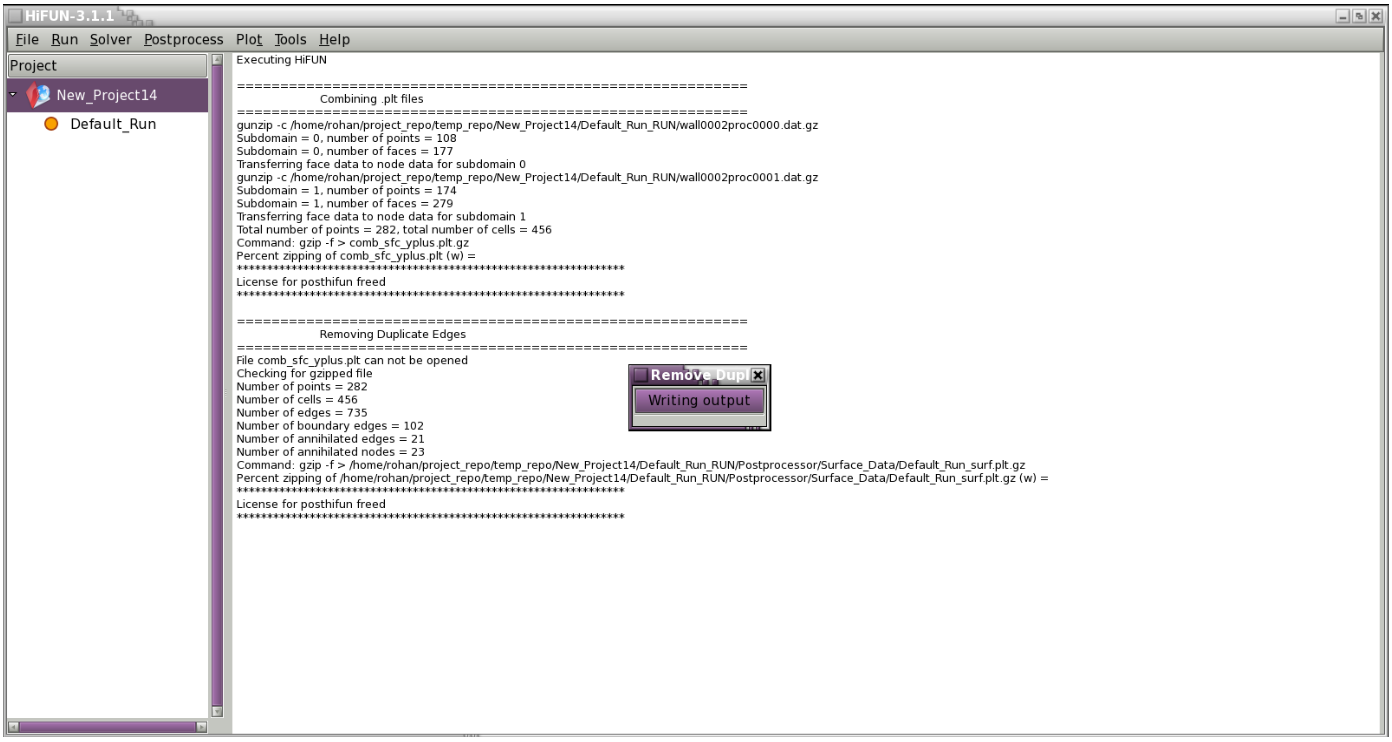

If user selects the option 'Wall Surface Data', the surface grid and the associated solution data is output in the tecplot-ascii format. The output file is stored in the following directory : <RUN directory>/Posprocess/Surface_Data

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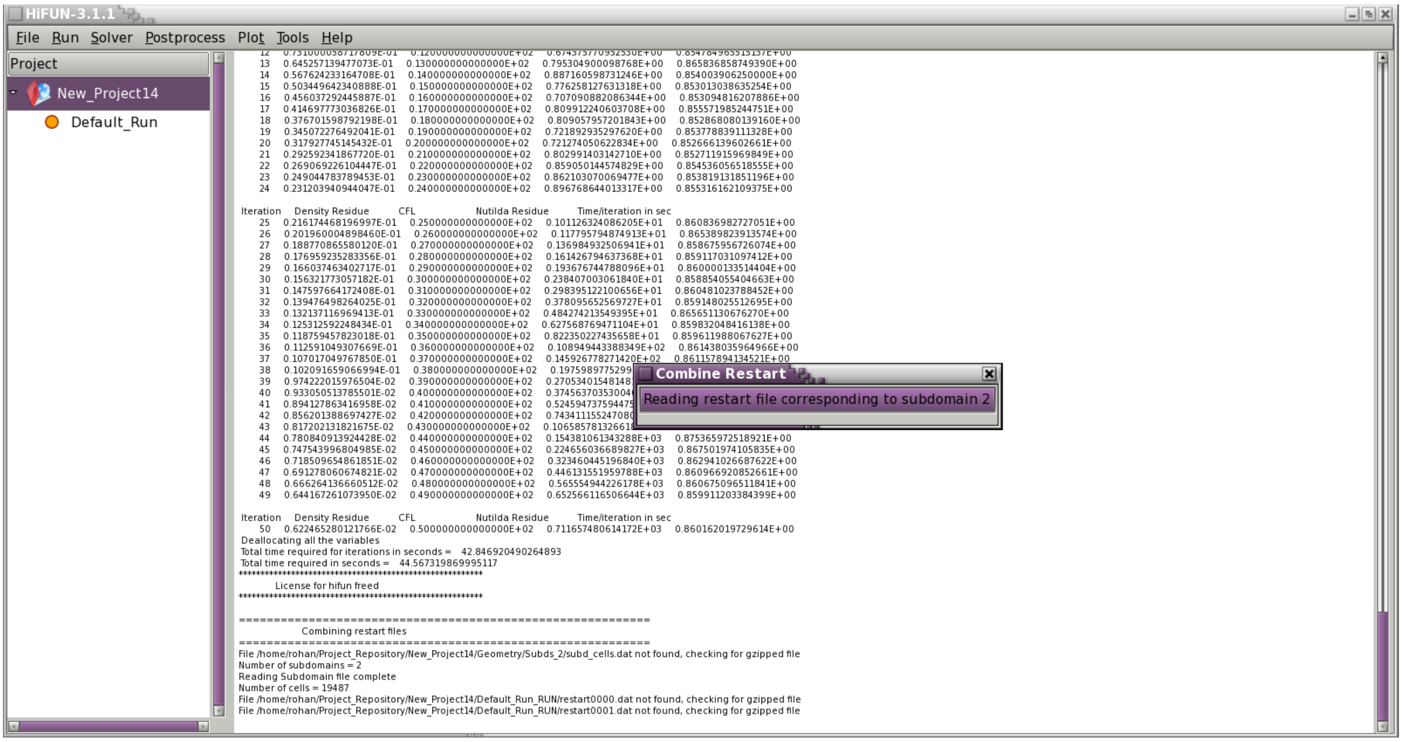
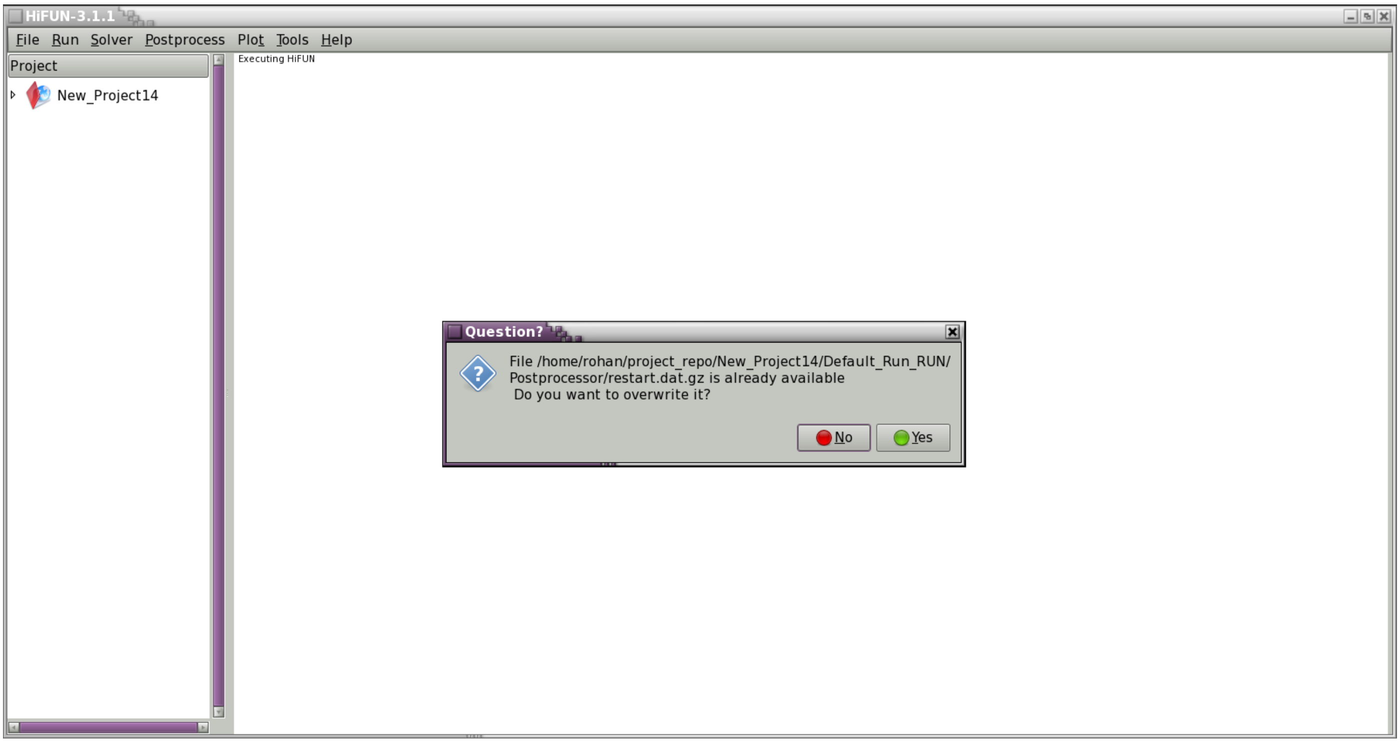
Option->Volume Mesh:



If user selects the option 'Volume Mesh', the solution files pertaining to all the subdomains are combined together into a single solution file pertaining to entire computational domain.



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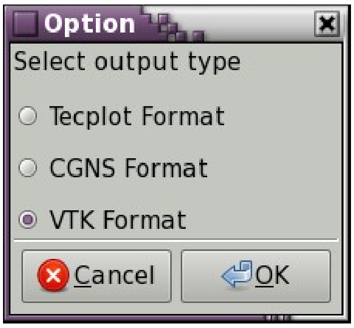
If combined solution file is already available, application will ask if user wants to replace this file or not.



There are three different output formats available for writing the volume data

- Tecplot Format
- CGNS Format
- VTK Format

In case the solution files are not available in the run directory, only the grid data is written.

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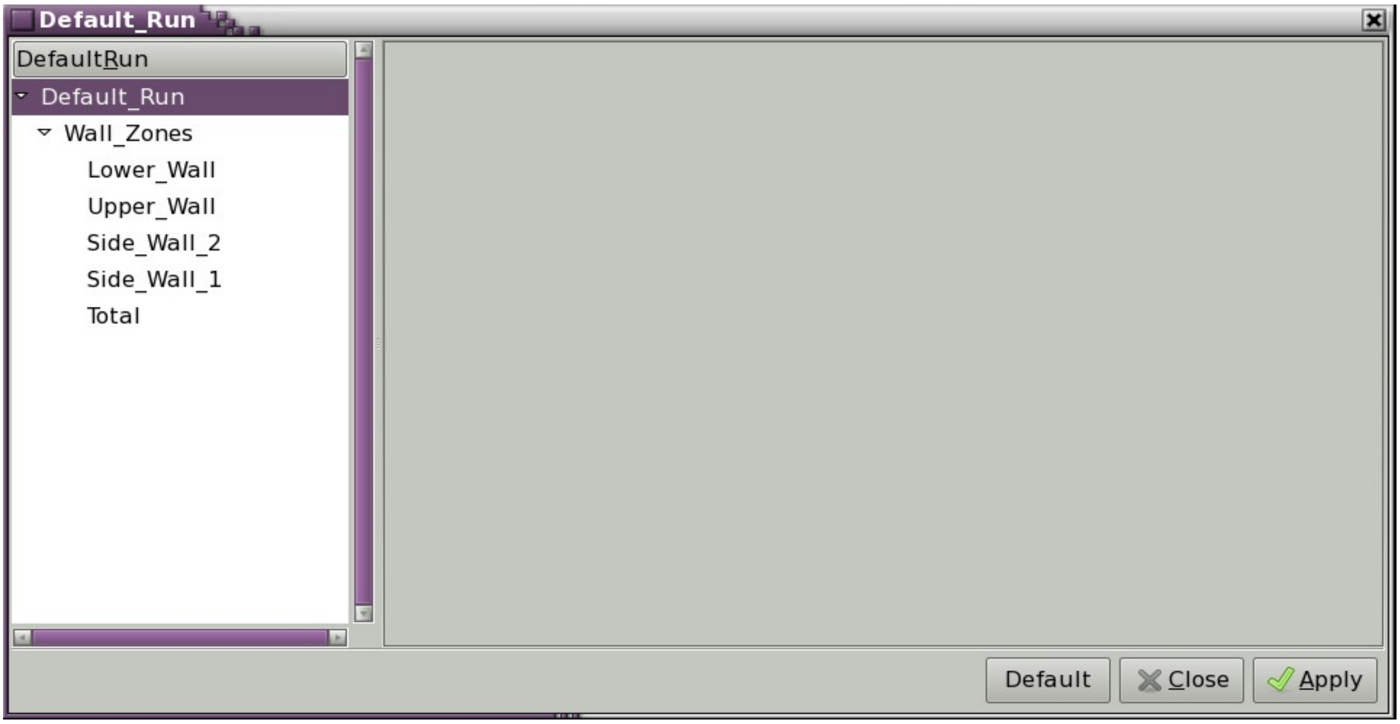
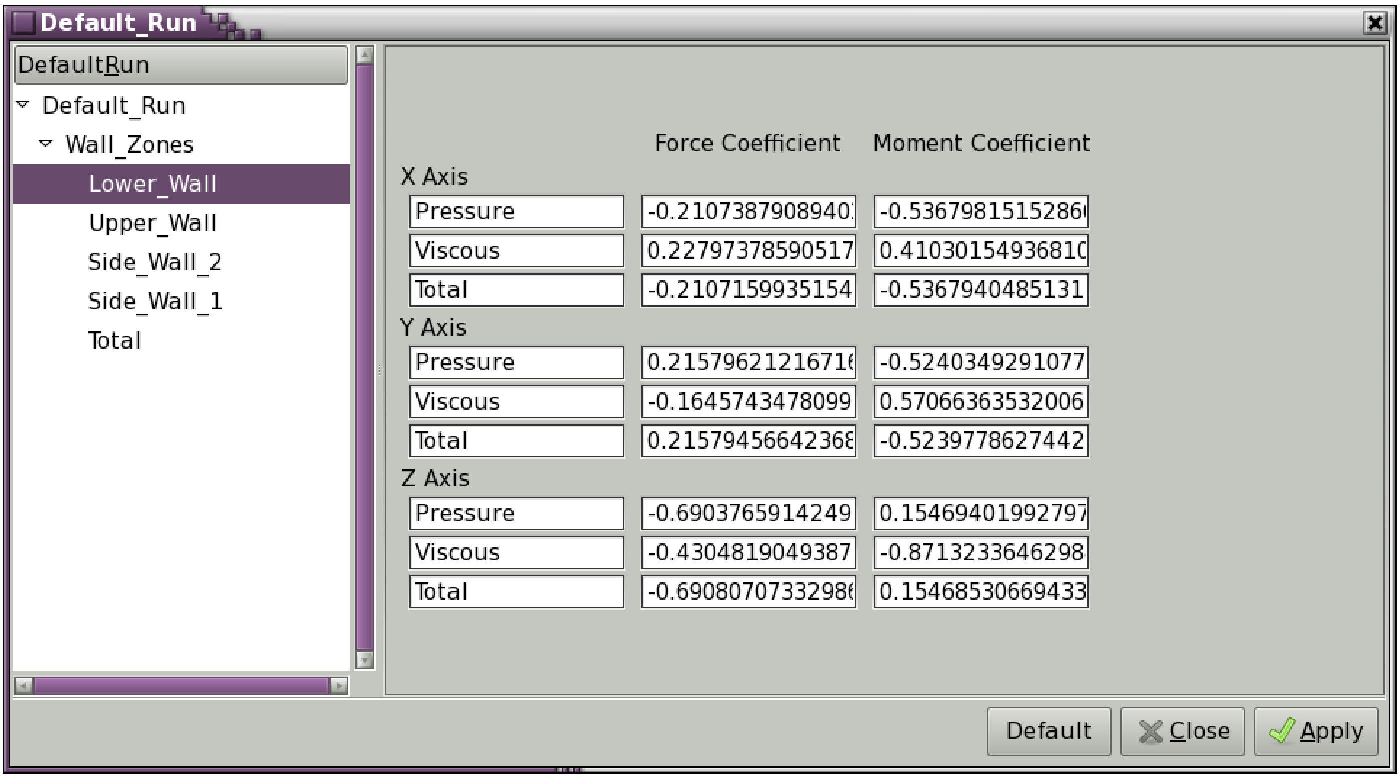
Postprocess->Show Wall Coefficients:

By clicking the sub-menu 'Show Wall Coefficients', an option window pops up. In this window, on left side, a list of all zone names having Wall boundary condition option will be displayed.



By clicking on each item in the left hand side list, user can get the values of coefficients for that particular zone.



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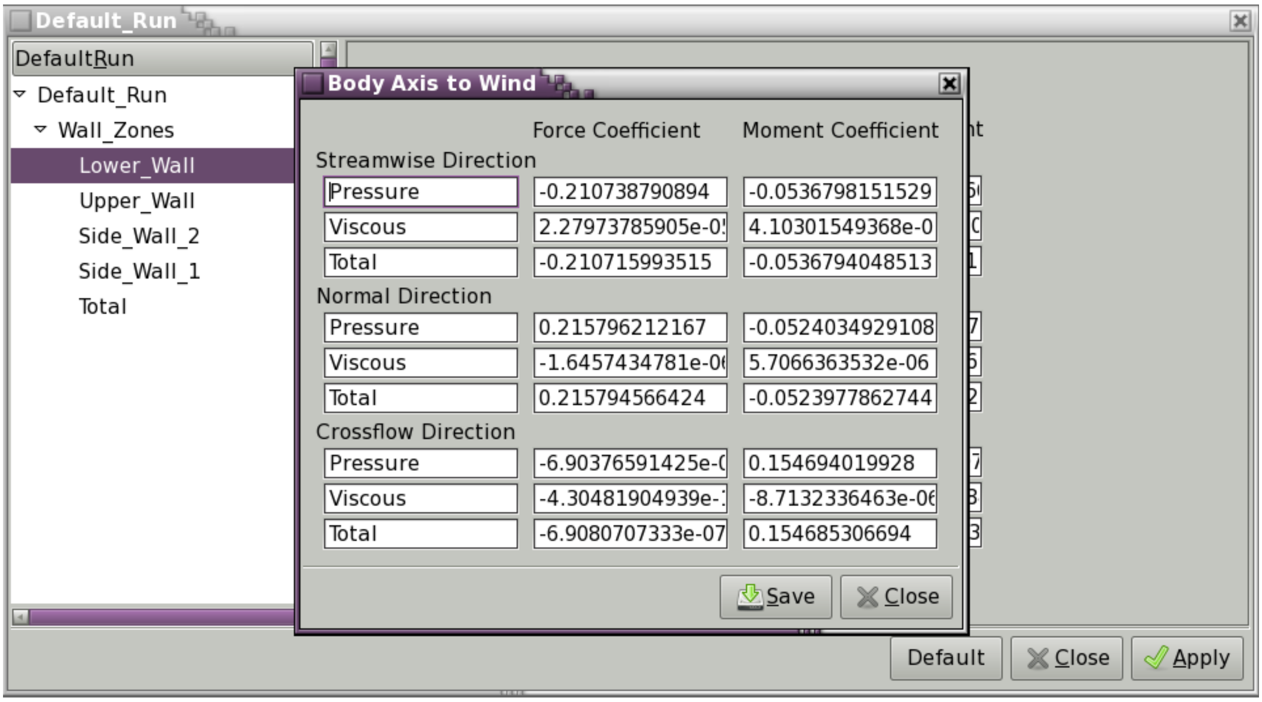
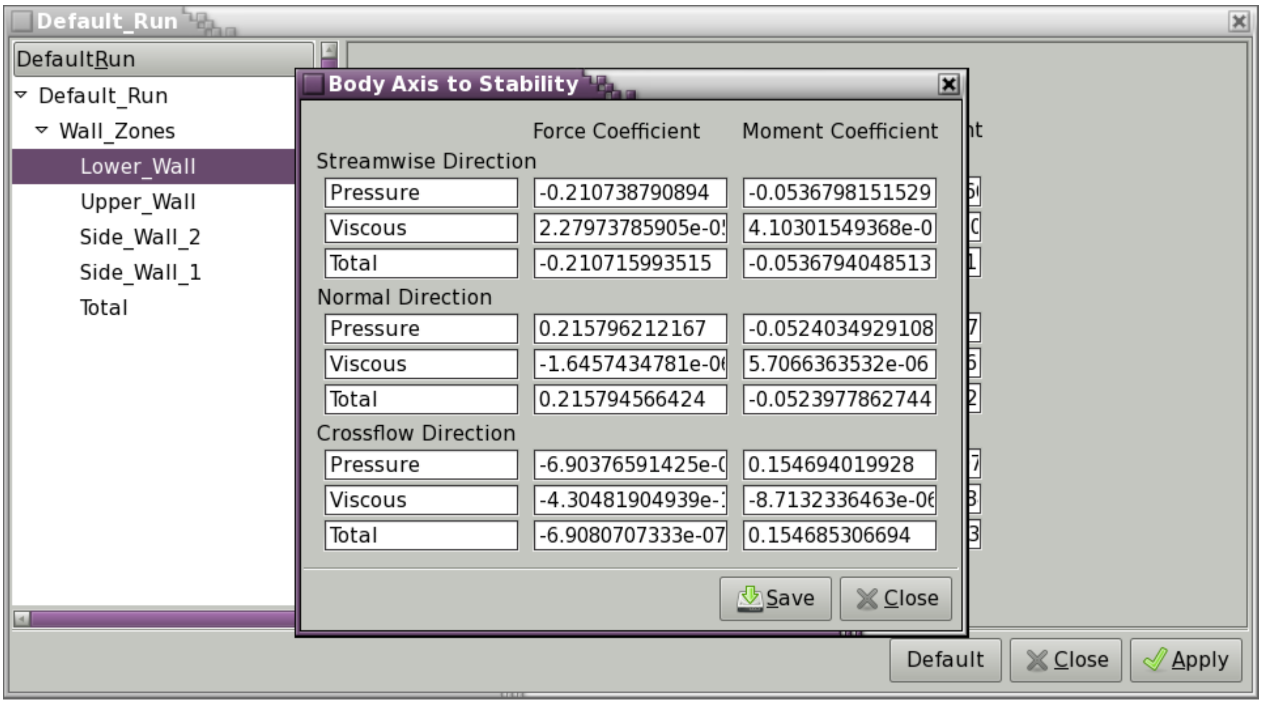
On Right Click, there are option menus to convert selected Wall Coefficient values from Body Axis to Wind Axis and from Body Axis to Stability Axis. User can save these values in a file for future reference.

Body Axis to Wind Axis



Body Axis to Stability Axis



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Plot:

This utility provides 2D plots. It has following submeus:

- Convergence Histories
- Force Coefficients Evolution
- Moment Coefficients Evolution
- Mass Flow Rate Evolution

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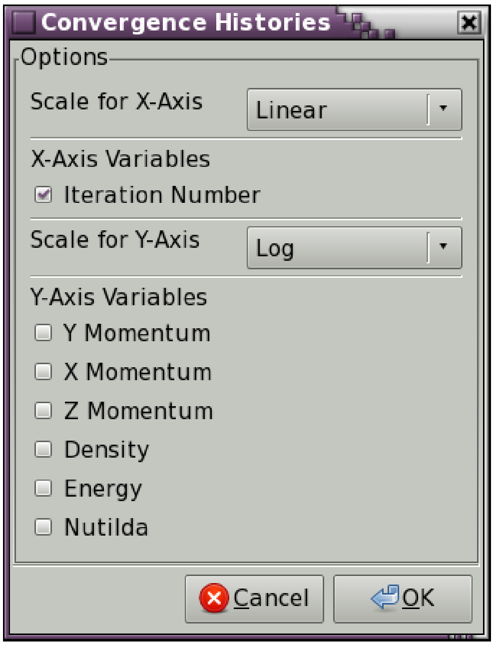
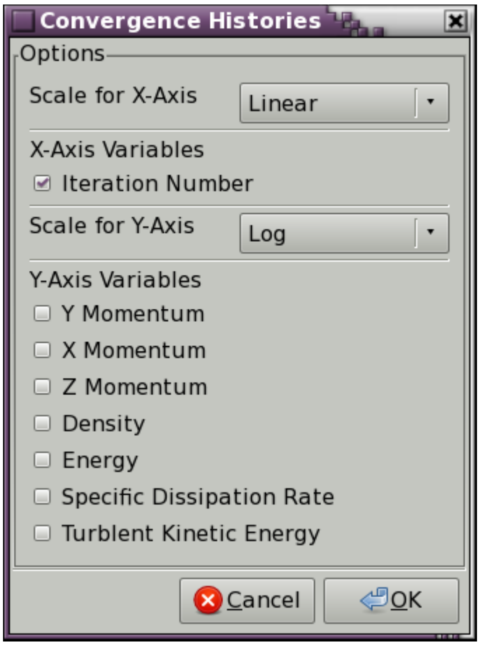
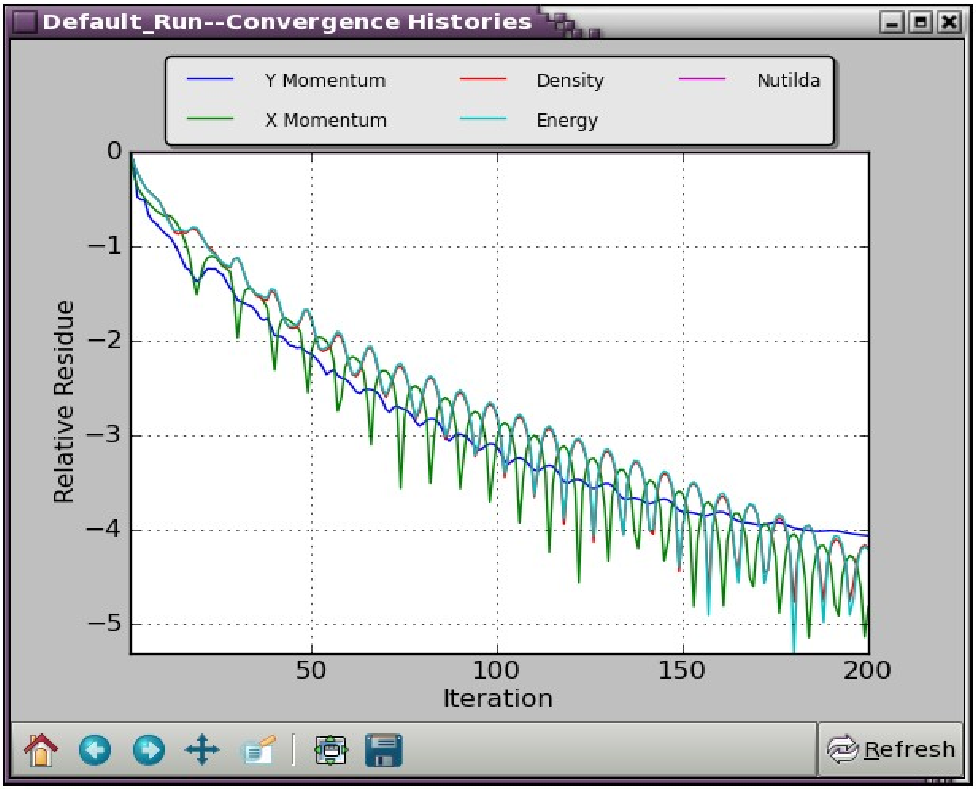
Plot->Convergence Histories:

Convergence Histories have following options for plotting





Plot will be displayed as follows:



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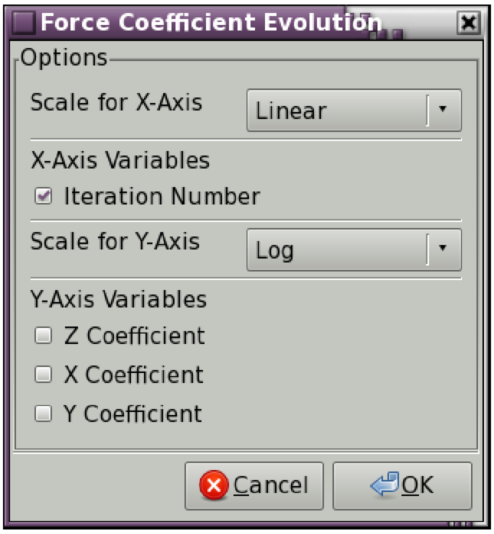
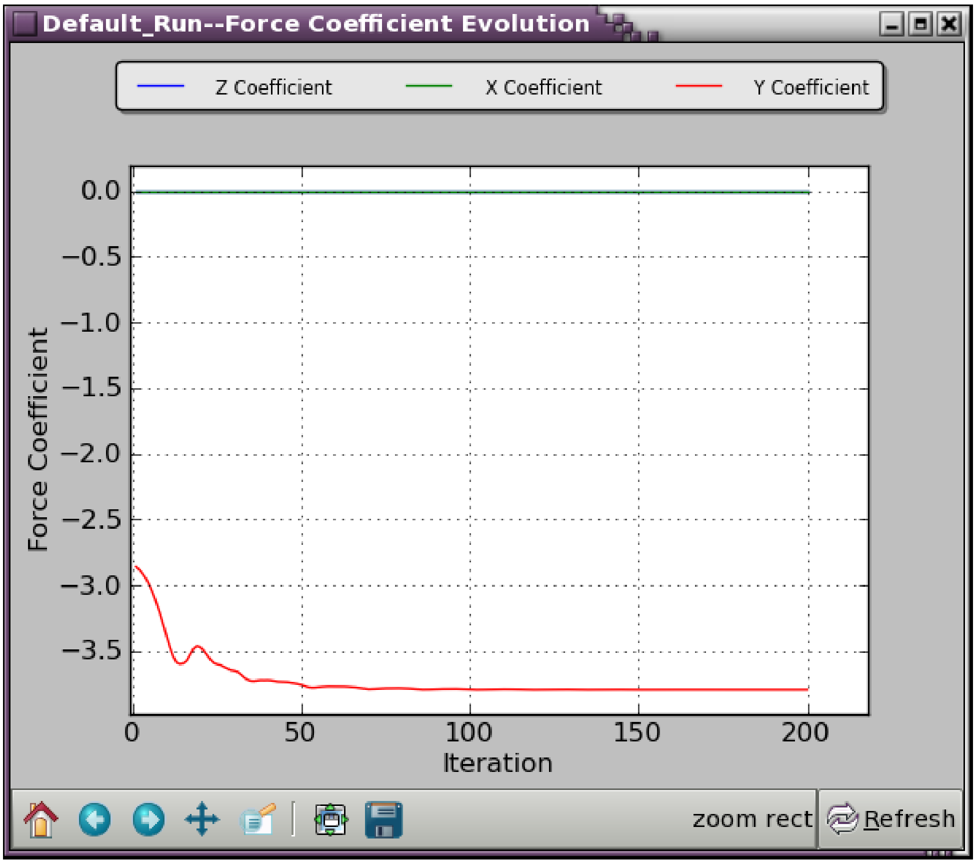
Plot->Force Coefficients Evolution:

Force Coefficients Evolution have following options for plotting



Plot will be displayed as follows:



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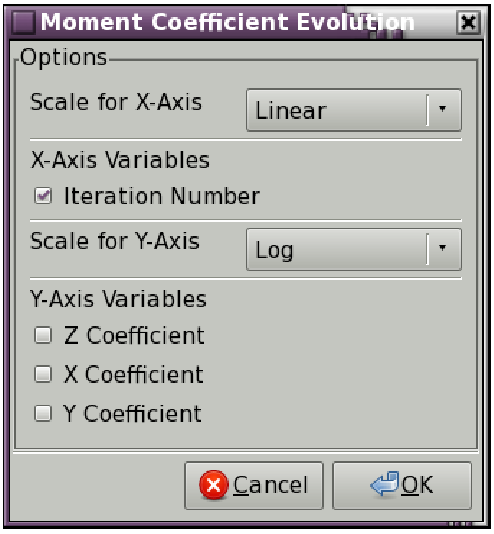
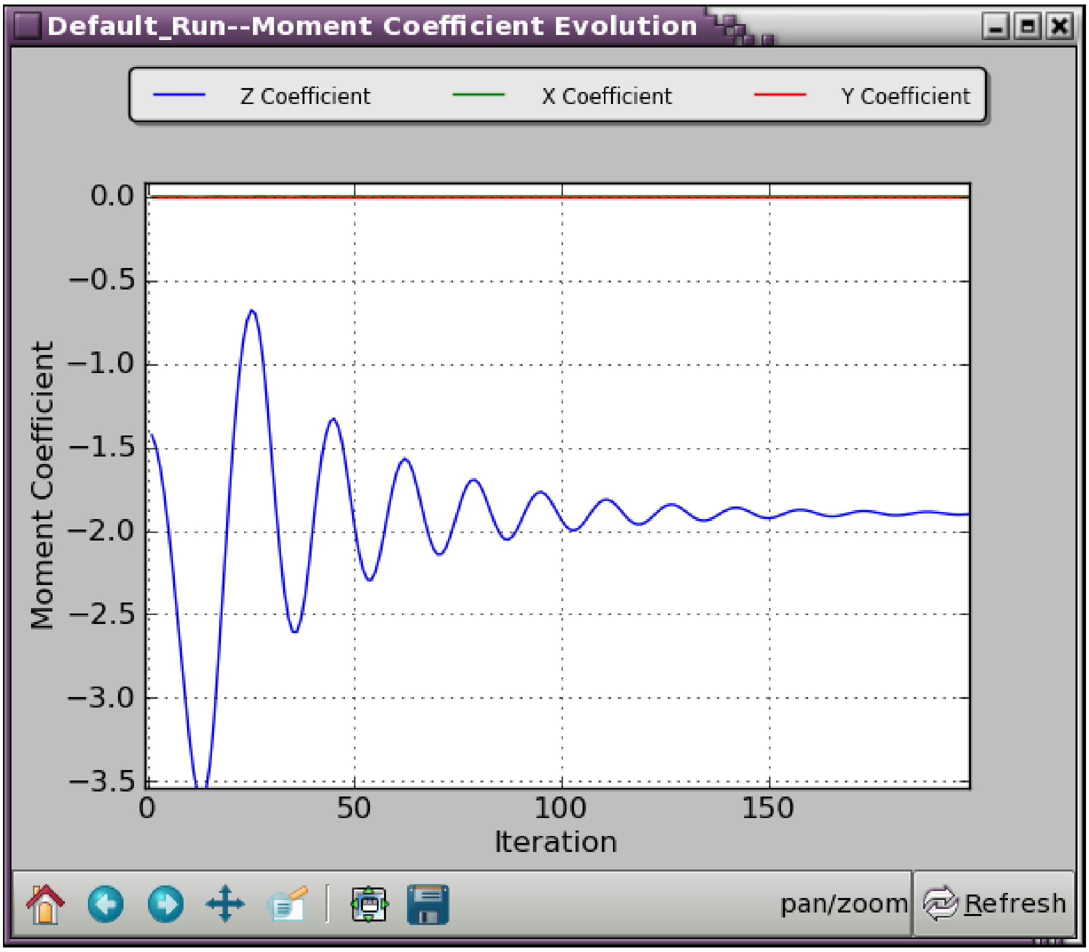
Plot->Moment Coefficients Evolution:

Moment Coefficients Evolution have following options for plotting



Plot will be displayed as follows:



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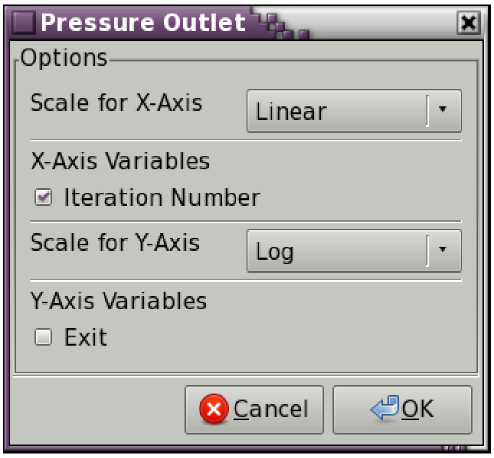
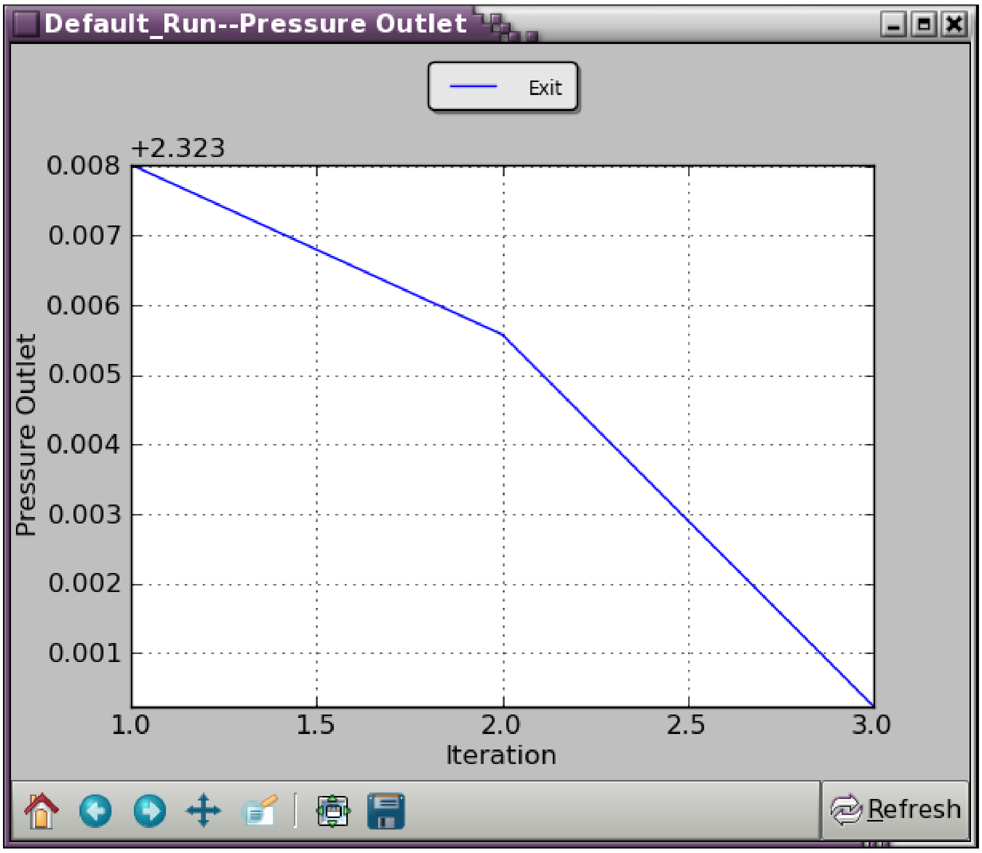
Plot->Mass Flow Rate Evolution:

Mass Flow Rate Evolution will give plot option for all available zones having Pressure Outlet boundary condition



Plot will be displayed as follows:



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On Y axis, the valuse may be plotted on linear or log scale.

For refreshing the plot, click button 'Refresh'.

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Help:

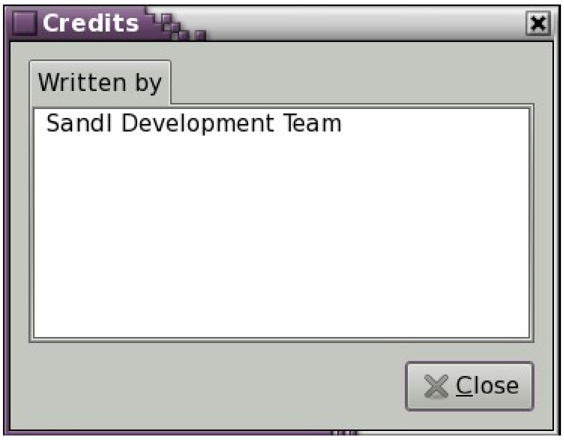
This menu has following submenus:

- Documentation
- About
- Disclaimer

Help->Documentation

It displays HiFUN's documentation in PDF format.

Help->About



This will display HiFUN Version and Developer Details.

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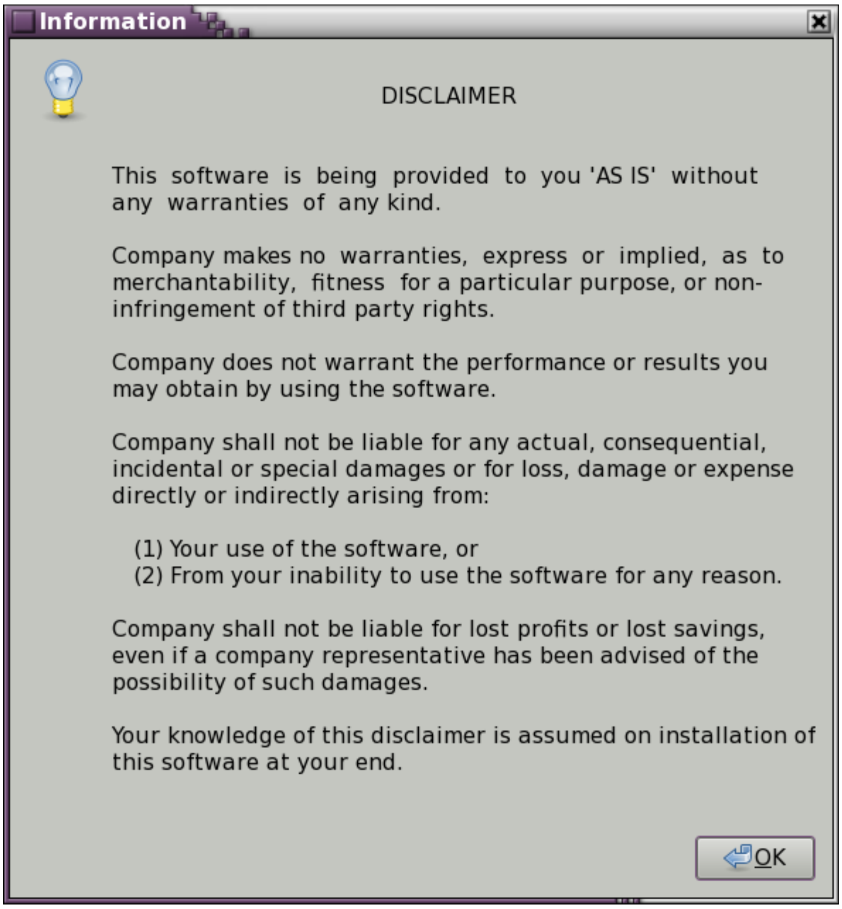
Help->Disclaimer



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Utilities:

HiFUN GUI provides few utilities to display/manage project/run properties.

For a Project, following utilities are available:

- Rename
- Zip/Unzip Project
- View Preprocessing Log
- Properties

For a Run, following utilities are available:

- Edit
- Copy
- Remap
- Rename
- Delete
- View Solution Log
- View Postprocessing Log
- Properties

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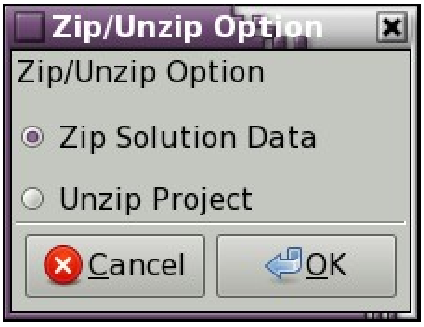
Project Utilities:

Rename:

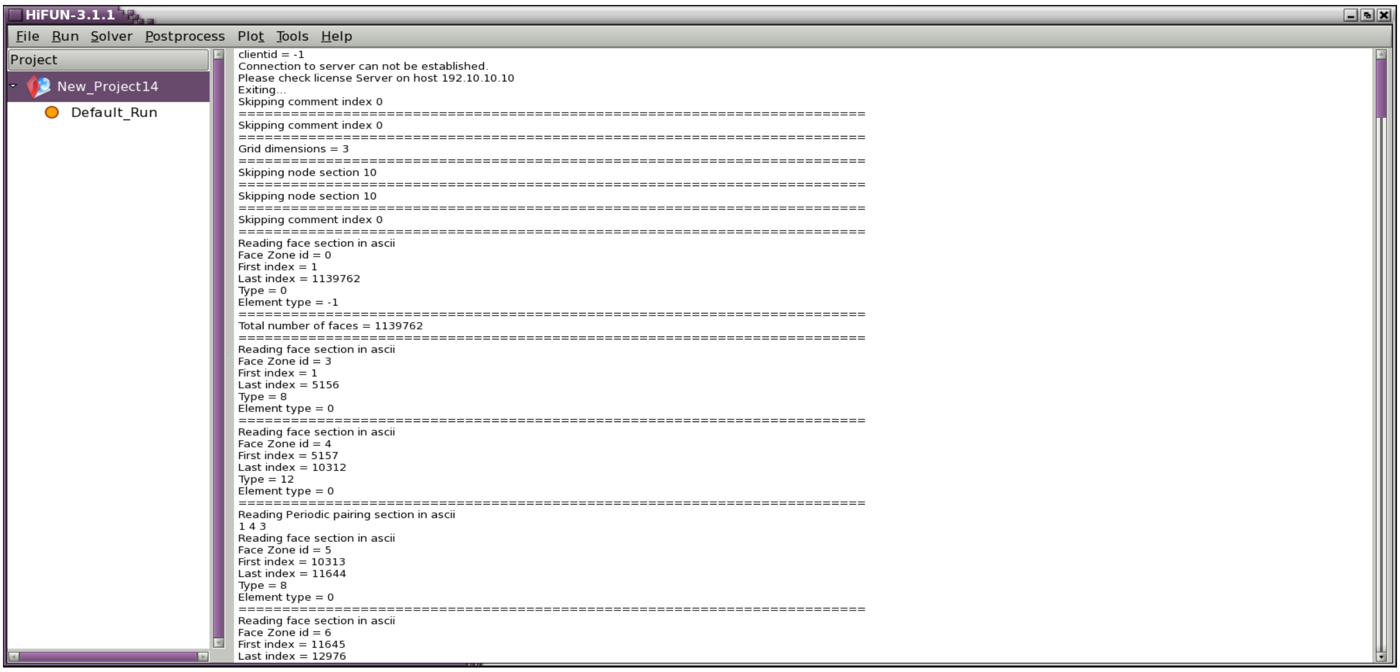
This utility enables the user to change project name.

Zip/Unzip:



This utility enables the user to zip or unzip the project and the associated run data.

View Preprocessing Log:



This will display preprocessor log on terminal window.

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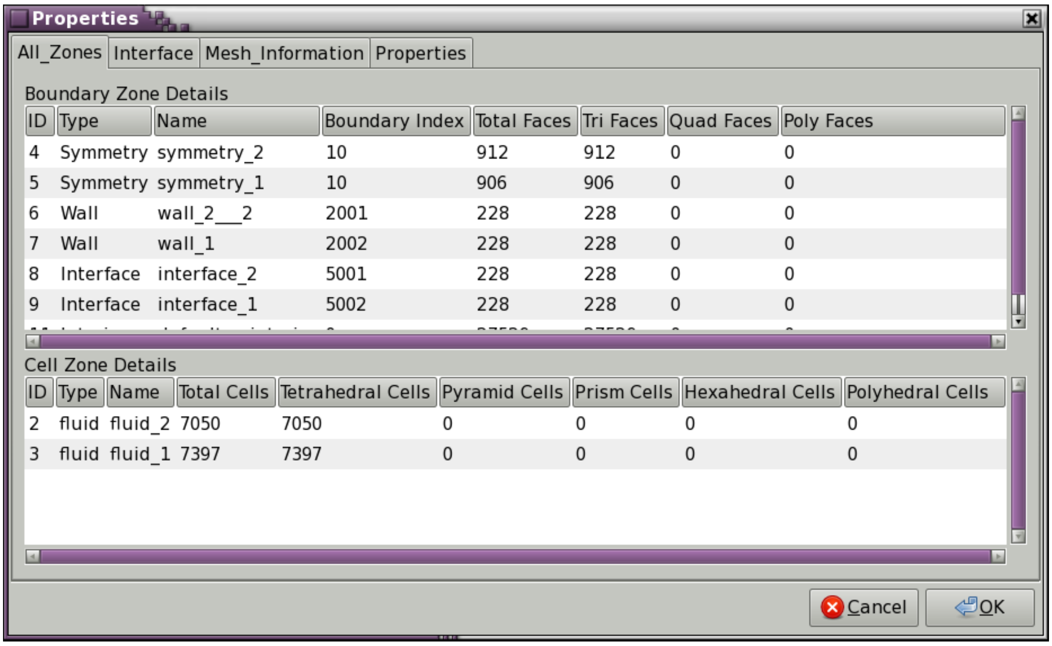
Project Properties:

This utility displays properties of the project.

3D Project Properties



Properties

All_Zones | Interface | Mesh_Information | Properties

Boundary Zone Details

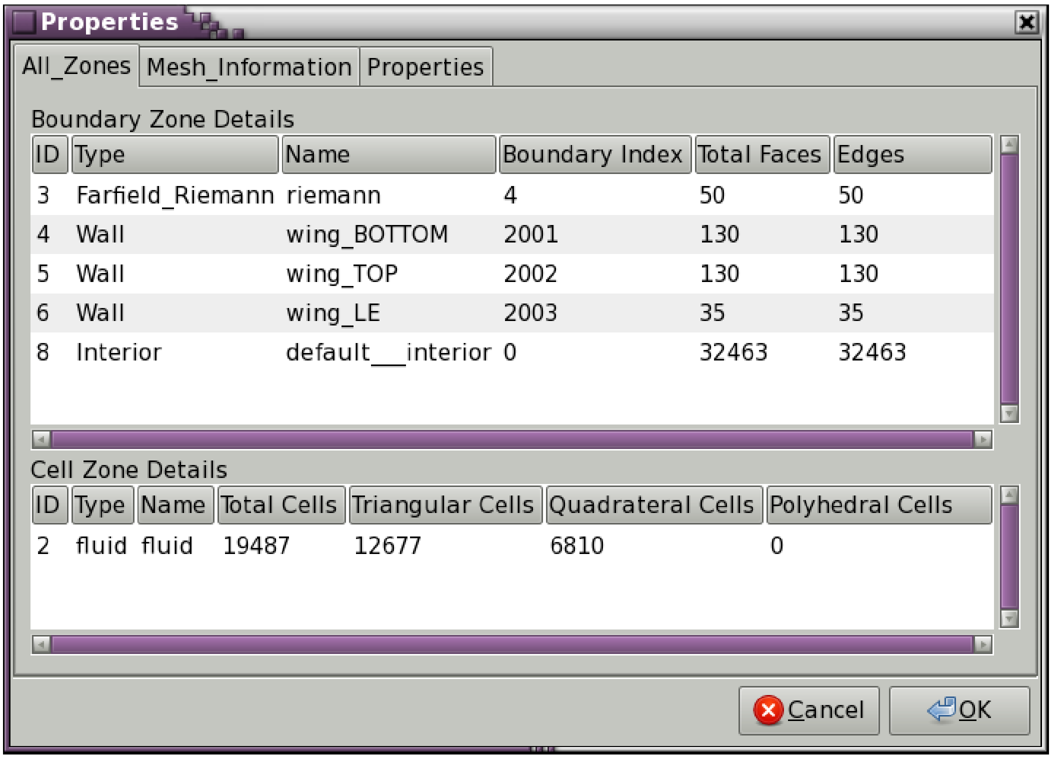
ID	Type	Name	Boundary Index	Total Faces	Tri Faces	Quad Faces	Poly Faces
4	Symmetry	symmetry_2	10	912	912	0	0
5	Symmetry	symmetry_1	10	906	906	0	0
6	Wall	wall_2__2	2001	228	228	0	0
7	Wall	wall_1	2002	228	228	0	0
8	Interface	interface_2	5001	228	228	0	0
9	Interface	interface_1	5002	228	228	0	0

Cell Zone Details

ID	Type	Name	Total Cells	Tetrahedral Cells	Pyramid Cells	Prism Cells	Hexahedral Cells	Polyhedral Cells
2	fluid	fluid_2	7050	7050	0	0	0	0
3	fluid	fluid_1	7397	7397	0	0	0	0

Cancel | OK

2D Project Properties



Properties

All_Zones | Mesh_Information | Properties

Boundary Zone Details

ID	Type	Name	Boundary Index	Total Faces	Edges
3	Farfield_Riemann	riemann	4	50	50
4	Wall	wing_BOTTOM	2001	130	130
5	Wall	wing_TOP	2002	130	130
6	Wall	wing_LE	2003	35	35
8	Interior	default__interior	0	32463	32463

Cell Zone Details

ID	Type	Name	Total Cells	Triangular Cells	Quadrateral Cells	Polyhedral Cells
2	fluid	fluid	19487	12677	6810	0

Cancel | OK

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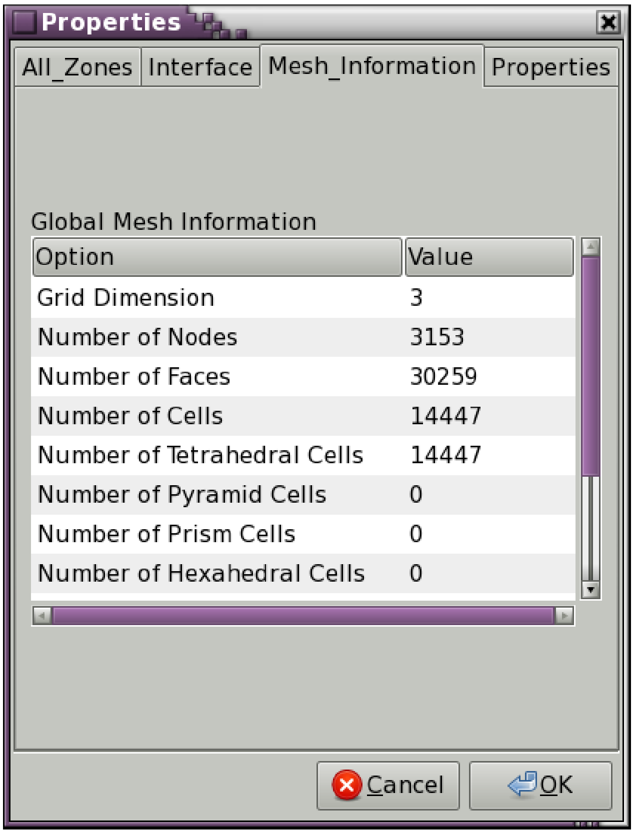
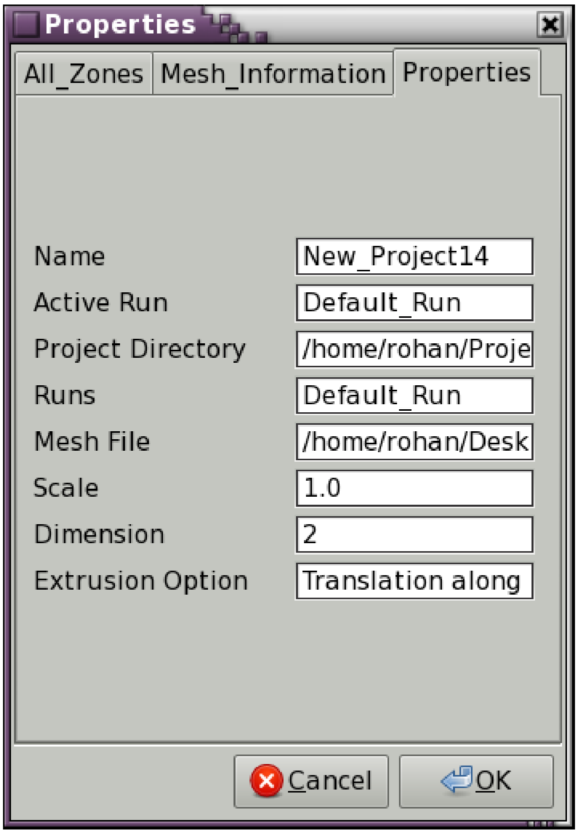
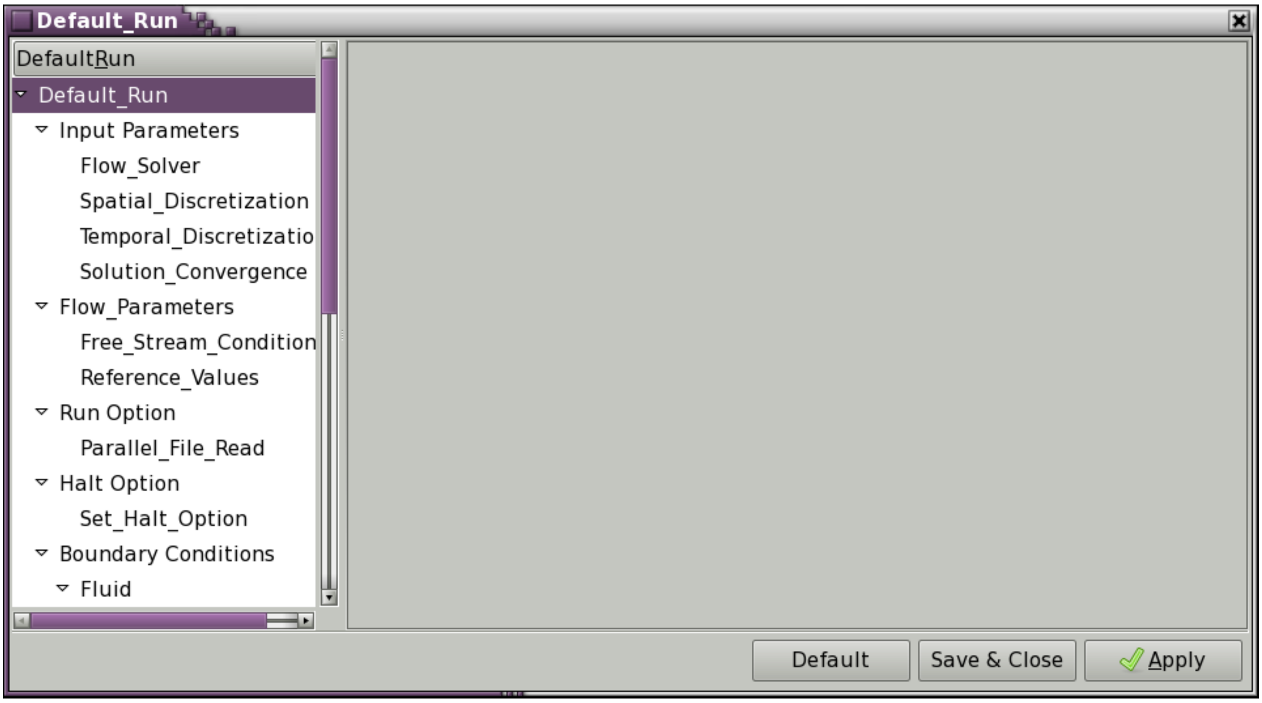




Run Utilities

Edit: This utility pops up solver input dialog window.



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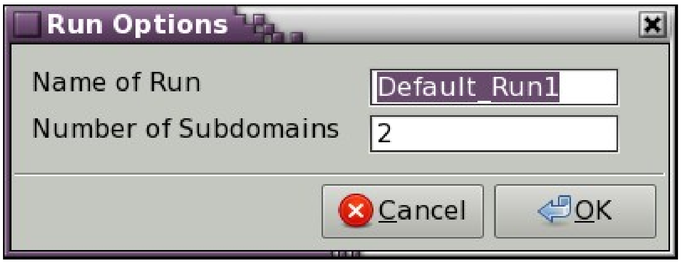
Copy: This utility can copy the entire run or only run properties to a New Run.

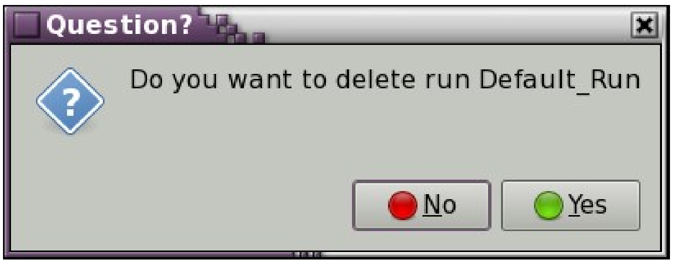
Remap:

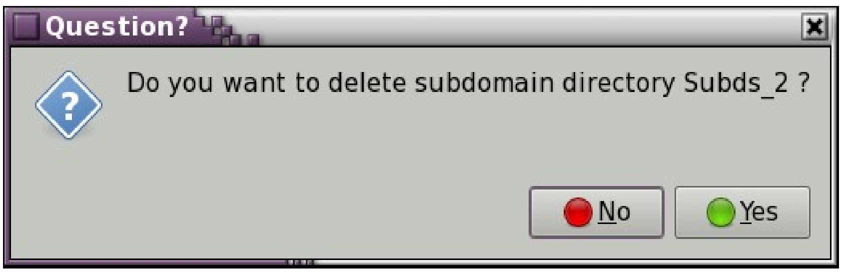
This utility can be used to remap the grid and solution data with given number of subdomains to a new run having different number of subdomains.



Delete:

User can delete any run using this utility. If the subdomain dictionary linked to this run is not linked to any other run, application will also ask if user wants to delete subdomain data.





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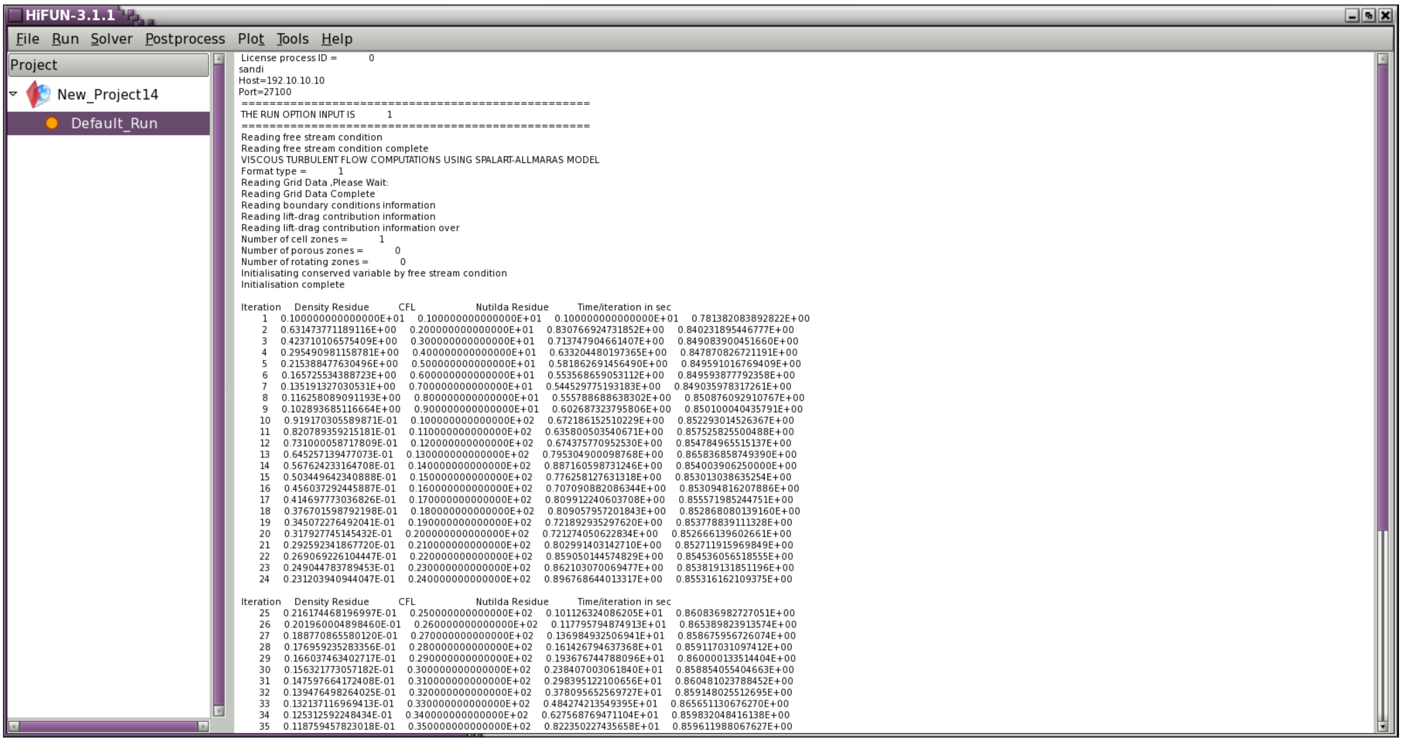
Rename:

This utility can be used to change the name of a run.

View Solution Log:



This will display solution log on terminal window.

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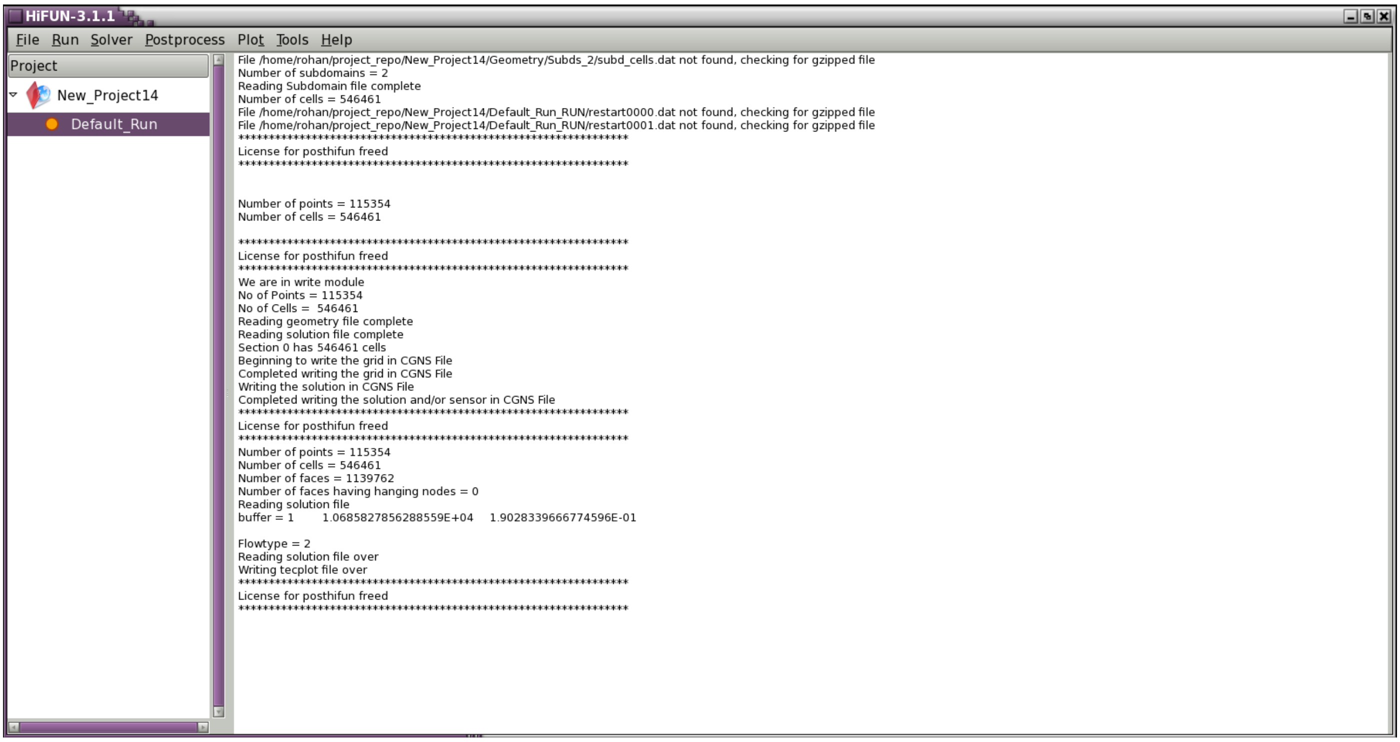
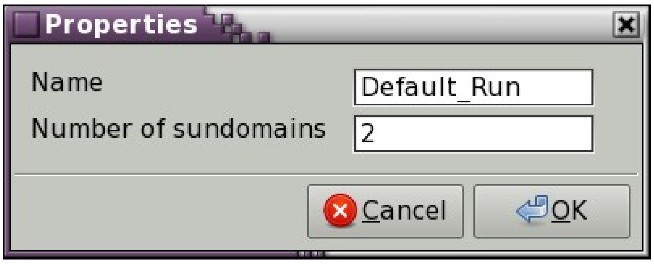
View Postprocessing Log:



This will display post processing log in application terminal window.

Run Properties:



This will show properties of current selected run. Properties include Run name & Number of subdomains linked with that run.

Note: The utilities associated with a run can not be used if solver execution is under progress in that run directory.

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HiFUN

Batch Mode Execution

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HiFUN batch mode execution has following steps:

- parse
- preprocess
- solver
- postprocess

parse:

It will parse the input .msh file and extract required zone information.

Write following options in '**hifunpre.dat**' file

<project option : 0 -> New Project, 1 : Old Project>

<Project Name or Project Directory Path>

<Absolute path to mesh file>

Command:

hifun batch parse hifunpre.dat <argument>

argument:

test

run

If argument is 'test', program will test the input file format and given values.

If argument is 'run', program will test the input file format and given values. It will run parser if file format & given values are correct.

Any error found, program will display the error/s on terminal and will exit.

Output:

Output will get written in same input file.

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preprocess:

After successfully completing parsing, user have to open and edit input file / hifunpre.dat, and modify the required information for preprocessing.

For e.g. User have to specify

- Scale to multiply
- Zip Option
- Periodicity Option in case of 2D grid data
- Boundary Condition for each Zone
- Cellzone information
- Interface Pairing Information
- Number of Subdomains

For the list available boundary conditions with HiFUN, user can refer to “Available_boundary_conditions.txt” in current working directory after completing parsing successfully.

Command:

hifun batch preprocess hifunpre.dat <argument>

argument:

test

run

If argument is 'test', program will test the input file format and given values.

If argument is 'run', program will test the input file format and given values. It will preprocess data if given file format & given values are correct.

Any error found, program will display the error/s on terminal and will exit.

Output:

All the files / data generated from preprocessing steps will get stored in given project directory.

For any error, please refer to 'hifunerr.log' in project directory.

solver:

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Once the preprocessing of data got successfully completed, user have to open same project in HiFUN GUI and create required number of runs.

After creating runs, user have to set the required parameter for each run and save the values.

After setting all the parameters, close the project.

To run solver in batch mode

Command:

hifun batch solver <rundirprefix> <runheader> <runtype> <smallest_run_number> <largest_run_number> <no_of_cores> <argument>

<rundirprefix> = Prefix path for run directories

<runheader> = Run header

<runtype> = general : General run

<runtype> = special : Special run

<smallest_run_number> = Smallest integer run number (usually 1)

<number_of_runs> = Total number of runs

<no_of_cores> = Number of processes/subdomains/cores to be used

<argument> = test : Tests input

<argument> = run : Tests input and executes the script

Note: <smallest_run_number> should be less than <largest_run_number>

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postprocess:

Command:

hifun batch postprocess <full path of project directory> <run name> <option> <output type> <argument>

Option:

1) surface for Wall Surface Mesh

2) volume for Volumn Mesh

3) both for Wall Surface Mesh and Volumn Mesh

Output types:

1) For Wall Surface Mesh

   * plt

2) For Volumn Mesh

   * vtk

   * cgns

   * plt

Valid arguments:

1) test

2) run

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