What's New in PHOENICS

Document last revised: 01.10.10

Changes made between PHOENICS July 2009 and September 2010

For more details about the reported changes click here.

Pre-processing

- Grid tolerance now in 3 directions
- Allow 'Affects grid' in 3 directions.
- Add pre-set compass directions to WIND
- Allow multiple WINDs in transient case for change of wind direction / speed with time
- Allow multiple ROTOR objects
- Add initial guess and relaxation for deduced velocity at OUTLET
- Allow for >999 objects when naming source patches on faces of 198 blockage
- Allow user-set InForm for EMIS in Immersol
- Error in auto-mesh fixed - grid refinement process stopped too soon
- Allow MPI version to be set in cham.ini file
- Ensure that objects placed completely outside domain do not create any PATCH commands for Earth
- Number of CAD formats supported increased to include:
  - STL   -   Stereolithography file. This is available in many popular CAD programs as an export format.
  - DXF   -   Drawing Exchange Format File (AutoCAD)
  - 3DS   -   Autodesk 3ds Max
  - WRL   -   Virtual Reality Modelling Language file
  - DW   -   Files generated by DesignWorkshop from Artifice
  - AC   -   Files generated by AC3D from Invis
  - IV   -   Files generated by Open Inventor
- Flair:
  - Allow FIRE heat and mass source to be read from table files
  - Set turbulence intensity for JETFAN
  - Enable inverse-linear density option
- Input File processing / PIL:
  - Faster processing of long Q1s with many InForms attached to objects
  - Faster processing of Q1 files with large number of time steps
  - Allow multiple ! in comment
  - Allow longer LABEL in PIL GOTO command
  - Fix loss of accuracy in PIL SORT function, and add tolerance for removal of duplicates
  - Allow PIL character variables to be up to 1024 characters long
- F1-in-Schools:
  - Add Bloodhound and Formula 1 classes
  - Allow for body STL which already includes wheels
- ESTER:
  - Correction to anode positioning when raising/lowering anode

Post-processing

- Store interpolated values in memory and reload when plotting same variable again to save time
- Improve time and profile plotting facility by allowing name of file saved to be specified
- Corrections to contour filling in PARSOL cut cells in polar coordinates
- Allow selection of first/last frame when saving streamline animation to control size of saved movie file
- Macro function:
    - Add continuous and inverse colour
    - Add recognition of photon mgrid/mvec commands
    - Save line plot to macro
    - Save line plot image from macro
    - Correction so that macro still functions after 'Cancel' has been pressed

Common

- When opening case:
    - Can change working directory to location of case files or copy case files to current working directory
    - Can preserve current view rather than switch to view saved in Q11
- Current working directory is displayed in status bar
- Better checking of license file location in registry to ensure that search path does not become too long
- Display 32/64 bit in window title and result file
- Editor / Viewer screen proportions fixed regardless of screen aspect ratio
- Default image type (gif, pcx, bmp or jpg) for saved images can be set in cham.ini

Earth Solver

- New PARSOL implementation for better detection and faster conjugate haet transfer solution
- Transient contribution to Nett Source printed to RESULT for Energy and scalars as well as mass
- Flow extracted by one ANGLED-IN can be used as source from another, e.g. for induction fan
- Parallel:
    - Nett source printout in RESULT brought into line with sequential
    - Error in source-sum calculation fixed
    - ANGLED-IN can lie across processor boundaries - previously would give wrong source
    - Linked ANGLED-INs do not need to be on same processor
    - STORE(IMB1) now works
    - Display of maximum absolute corrections in graphical monitor works
    - Reading of FACETDAT containing large number of facets fixed. Previously wrong format was used.
- InForm:
    - Allow longer and more complex formulae - up to 100 operands
    - Creation of tabular output written once per sweep or once per time step
    - Allow for modification of porosity by InForm
    - Add recognition of BFC geometry quantities
    - Allow file name in PWLF function to start with /
    - Correction to indexing of OLD() function
    - Correction to SUM function in parallel

- - Error in diffusion coefficients for scalars when any property set with InForm fixed
- Flair:
  - FIRE heat and smoke sources written to table files for easy comparison with input data
  - Additional convergence monitoring information written to table file
- GENTRA:
  - ANGLED-IN / ANGLED-OUT can act as GENTRA exits
  - Wall reflection for very small domains fixed
  - Flair SPRAY_HEAD can activate GENTRA tracks when link temperature exceeded
- Changes to relaxation made interactively during the run written to RESULT
- Monitor interrupt screen buttons do not disappear when window is moved or obscured and revealed
- Add missing inflow source contribution for TEM1 in cut cells
- Save friction force on blockages in case when PARSOL=F and no cut cells
- Correction to LVEL for GCV multi-block cases
- Correction to calculation of GENK in GCV multi-block cases
- 64-bit version can be compiled with long integers, allowing even larger cases to be run
- Updates to MFM
- Updates to USP and USP mesh generation

For more details about the above changes click here.

Changes made between PHOENICS April 2008 and July 2009

Pre- and Post-processing

- Ambient pressure and temperature can be set, and used for:
  - initialisation,
  - the external temperature at selected inlets, outlets/openings, and
  - to deduce the buoyancy reference density.

  This makes it much easier to change the external temperature/pressure at many openings in a consistent fashion. It also ensures that the buoyancy reference density is more likely to be set correctly.

- The new WIND object automates the setting of atmospheric boundary layer conditions at the domain edges. The wind direction is set by a single number representing the wind angle from North. The Editor then sets inflow-outflow conditions on the appropriate faces of the domain. The sky and ground boundaries can also be included.
- Clipping planes are made available in the Editor and Viewer. These enable the user to see inside complex shapes by clipping away the parts which are blocking the view.
- The number of sweeps per time step can be set from the Editor Main Menu Numerics panel (it was always possible with InForm). In many transient cases more sweeps are required for the first few steps, and possibly later on when a boundary condition changes - a jetfan switches on or off for example.
- Patches attached to USER-DEFINED object are listed by name as part of the object attributes in The Q1 file. This makes hand-editing the Q1 much safer, as the patch-object link no longer depends on the object sequencing.

- In-form statements can be directly attached to an object. If the object is copied (or arrayed), the Inform commands are also copied.
- FLAIR:
  - Add list of fire speeds for t^2 fire as a pull-down menu.
  - Improve the linearisation of the fire heat source to aid convergence.
  - Automatically reduce the maximum increment for TEM1 when a FIRE object is active.
  - Allowance for heat lost by radiation when setting FIRE heat source. This allows
  - Calculate Beer-Lambert visibility reduction as post-processing option in Viewer. This is a means of determining if a position can be seen from other locations, or if it is obscured by smoke.
  - Add derivation of optical density. Another means of assessing the effect of smoke on visibility.
- SPINTO for interpolating solution files on to finer (or coarser) grids.
- An automatic unstructured-grid generator for Unstructured PHOENICS. This can automatically refine an initial structured starting grid to give better resolution near object surfaces.
- SHELLFLO, a Prelude gateway for shell and tube heat exchangers.
- Dot-patches introduced. This is a way of setting the patch limits in terms of physical location and size, not cell numbers.
- The View centre can be jumped to current probe position, or location of minimum or maximum value in Viewer. This makes it much easier to find the minimum and maximum value locations.
- The length of a Q1 line has been increased from 132 characters (68 characters and one continuation line) to 1024 characters split over as many continuation lines as needed. This makes the creation of complex Inform commands easier.
- The font size can be changed in Editor/Viewer. If a dialog is too tall to display on screen, reducing the font size will make it fit.
- Better attribution of units to plotted variables in Viewer. Where possible, the Viewer will display the units of the plotted variable.
- The Viewer display can be switched to FPS or cgs units instead of the default SI units.
- When the domain is scaled, vector heads retain their original scaling. Domain scaling is useful for long, thin domains such as tunnels. Not scaling the vector heads improves the appearance of the plot.

Earth Solver

- The 'Nett source' section of RESULT includes average scalar values at mass source patches. For pressure boundaries, the inflow and outflow is given as well as the nett flow.
- For transient cases, the transient contribution to the mass sources is printed, so the mass sources should balance.
- The number of sweeps can be changed at Earth runtime. This is particularly useful in transient cases. The number of sweeps can be increased if the step is not converging well, or decreased if it has converged.
- Thin inclined plates can be handled as InForm INFOB 'PLANE' objects.
- The format of PBCL.DAT file has been changed to make writing more efficient. When PHIDA=T in PREFIX, PBCL.DAT is also unformatted. Old-style PBCL.DAT files are still accepted by Earth and Viewer.
- PHIDA=T is now the default. This makes the saved files smaller, and also quicker to read and write.
- If the main F-array size is increased at the start of a run, the increased size is

written to a local CHAM.INI file to remove need for expansion on next run.

- Earth can output data in VTK format for the ParaView post-processor.

For more details about the above changes click here. For a more general list of improvements and corrections, see the Release Notes, TR327.

Changes made between PHOENICS August 2007 and April 2008

- The protected mode of satellite operation, facilitating relational data input
- Unstructured PHOENICS, USP
- Solid-stress-simulation feature uses collocated displacements as alternative to staggered displacements.
- Objects can be tagged to always be at domain end, and to extend to domain end. Makes changing domain size easier as tagged objects will follow automatically.
- For WIND_PROFILE object, profile starts in first un-blocked cell in each column.
- FLAIR. Fire and smoke dialogs updated to use current standards terminology.
- FLAIR. Diffusers can be rotated about any axes.
- Objects can still be selected when grid mesh display is on by holding down Ctrl key.
- InForm editor and other utilities now executables, so no need to install TCL.
- Drawing of objects in wireframe enabled on per-object basis.
- Separate increment size for each direction.
- Snap-to-grid feature - objects must be multiples of increment.
- Added handling of PHOTON-style PLINE elements.
- Save image as jpg file.
- MOFOR enabled in parallel.
- CVD enabled in parallel.
- Allow use of {} to denote physical coordinates for variable location in InForm.
- Better initial guess at size of F array required, and use of scratch file if expansion fails. Should allow bigger cases to run on 32-bit systems.
- Use of material >= 299 for blockage treats cut cells as blocked and opens un-cut cells. Allows simple angled thin plate treatment.

For more details about the above changes click here

Changes made between PHOENICS October 2006 and August 2007

- Use of textures
- Improved control of lighting for objects
- Possibility to show thumbnails of geometry files
- Save as a case and Open existing case save and restore intermediate step/sweep files.
- In Flair/HOTBOX the file holding the fan characteristics curves can be edited directly from within the interface.
- In Flair/HOTBOX the list of fans present in the fan data file is presented as a selectable list.
- In Flair there are two sight-length variables, for weakly-reflective and light-emitting objects.
- Point_history object can select which variable(s) to create time history information for.

- When PARSOL and GENTRA are active together, the particles will bounce from the true faceted surface of the object.
- Parallel PHOENICS has been amended to enable it to work satisfactorily with moving objects,
- The calculation of forces and moments on blockages has been extended to non-faceted objects which use cube***.dat as a geometry file.
- The calculation of forces and moments is correct for cylindrical-polar coordinates.
- The time-history plots in RESULT can now extend to 99999 steps.
- Built-in interfaces to TECPLOT and FIELDVIEW extended to BFC multi-block.
- The tabs of the Options dialog have been updated to provide more control over the displayed image.
- The user can select any 1, 2 or 3 variables to use as vector components.
- The vector component normal to the plotting plane can be toggled on or off to assist in visualising secondary flows.
- A line graph of any variable can be drawn between two specified points.
- 'Show Results' scans through RESULT for the data relating to the time-step (or sweep) currently being plotted.

For more details about the above changes click here

Changes made between PHOENICS version 3.6.1 and 2006

- The location of the PHOENICS installation is now held in an environment variable.
- The handset buttons are now repeated on the tool bar.
- Text can be added to annotate the image.
- The domain axes can be positioned anywhere.
- A larger font size is used for dialogs to make them more legible.
- It is possible to turn the hardware acceleration of the graphics card off with a switch in the CHAM.INI file.
- An auto-meshing feature has been added.
- New ANGLED-IN and ANGLED-OUT object types have been created.
- The treatment of Polar geometries has been significantly updated.
- The treatment of INLET objects in Polar co-ordinates has been improved.
- The 'Slide velocity' can be set for blockages as well as for plates.
- The input for multiple STL import is now taken from a multiple-file-selection dialog not from a list-file as previously.
- For MOFOR, the MOF files controlling the motion can be created and edited directly from the Sources page of the Main menu.
- The Editor can output the entire geometry in TECPLOT format.
- When PARSOL is active, the cut cells are calculated properly for polar geometries.
- For buoyancy-driven flows, the effect of buoyancy on turbulence has been generalised
- The solution can be output in TECPLOT format.
- Domain partitioning has been introduced via transfer objects.
- When PARSOL is active in Polar co-ordinates, the contours and vectors in the cut cells are displayed correctly.
- When cyclic boundary conditions are active, an extra tab appears on the Viewer Options dialog, from which it is possible to repeat the image in X direction as many times as wanted.
- For selected objects, the surface contour values can be output to a file which

can be read into Excel or Autoplot.

- For selected objects, a surface profile on the current plotting plane can be output to a file which can be read into Excel or Autoplot.
- The palette for contour plots can be reversed.
- The size of the saved image can be controlled from a macro file.
- Many internal efficiencies have been implemented to speed up the plotting of large cases.
- The vectors can be plotted in any user-selected single colour.

For more details about the above changes click [here](#)

For details about the earlier changes click [here](#)