

## Changes to FRANC3D from Version 7.5.3 to 7.5.4

Apr 27, 2021

- 1) Add support for abaqus Riks keyword.
- 2) Allow user to turn on/off ABAQUS NIgeom setting when applying crack face contact.
- 3) Fix issue handling a space and quote in ABAQUS set name.
- 4) Check for tab character in NASTRAN input files.
- 5) Fix SIF path and fatigue life path for the user defined plane path option.
- 6) Transfer node rotations on cut-surface nodes that also fall on the model surface.
- 7) Add some additional GUI checks on surfaces/sets for local + global connections.

## Changes to FRANC3D from Version 7.5.2 to 7.5.3

Feb 5, 2021

- 1) Fixed an issue with format/display of equations for crack growth rate plots.
- 2) Fixed y-axis units label for  $da/dN$  vs  $dK$  plot.
- 3) Fixed XY plot y-axis format for near-flat-line data.
- 4) Fixed ANSYS extraneous file cleanup for `-smp` and multiple processors.
- 5) The previous ABAQUS load step solver options are applied to extra crack face traction (CFT) load steps.
- 6) Fixed an issue with ABAQUS models with CENTRIF type loading applied to multiple element sets (or regions).

NOTE: there is a limitation; the local model cannot contain the entire element set. Part of the element should be stored with the global portion, otherwise franc3d will determine that the CENTRIF loading is applied to a non-existent element set and discard the load.

## Changes to FRANC3D from Version 7.5.1 to 7.5.2

Jan 11, 2021

- 1) Fixed issue when closing the SIFs dialog when displayed from the crack growth wizard.
- 2) Added the `do_epj` flag to the `ComputeSifs` command or session log to compute elasto-plastic J.
- 3) Added the `WriteEPJ` to `PyF3D` module to save the elasto-plastic J values.
- 4) Fixed an issue with crack front template parameters not being set correctly during playback of command or session log files.
- 5) Write ANSYS pilot and pretension node rotations to the `.cdb` file.

## Changes to FRANC3D from Version 7.5.0 to 7.5.1

Nov 13, 2020

- 1) Mapping ANSYS nodal rotations for midside nodes when upgrading linear to quadratic elements was fixed.

- 2) Mapping ANSYS SFE data to tetrahedral element faces was fixed; occurs when the last SFE value is 0.0 rather than a repeat of the previous value.
- 3) Modifications were made to improve new crack growth surfaces for cracks that twist and kink significantly.
- 4) Smoothing of crack front points for user-defined crack insertion was modified specifically for interior cracks with closed-loop fronts, and an option to save the smoothed points was added.
- 5) A bug in the fatigue crack growth extension calculations was fixed.
- 6) A crash associated with the file path for the ABAQUS \_global.inp was fixed.
- 7) A crash when plotting the NasgroV4 equation/data was fixed.
- 8) Reading ANSYS TB BISO material data was corrected.
- 9) Writing ANSYS node-based TEMP table data was corrected.
- 10) A preliminary version of ANSYS BFBLOCK reader was added.

#### Changes to FRANC3D from Version 7.4.9 to 7.5.0

Sept 16, 2020

- 1) B-spline uniform parameterization bug fixed; it could affect crack front point fitting/smoothing.
- 2) Make sure output ABAQUS \*STEP name is unique for each load step.
- 3) Output ANSYS solver type to .cdb file based on original solver type.
- 4) Fix table tab display of delta K value in Crack Front Plots dialog.
- 5) Fix bug in cycle integrations when hold time is set and K is not set constant.
- 6) Process ABAQUS \*equation data when formatted as multiple equations under single \*equation heading.
- 7) Clean up main window title bar file names.
- 8) Updates for NX NASTRAN – in particular for contact and crack face contact.

#### Changes to FRANC3D from Version 7.4.8 to 7.4.9

June 16, 2020

- 1) Clear ANSYS surf154 elements from local model after mapping pressure to solid elements.
- 2) Save the Normal to Surface setting when defining local crack coordinate system.
- 3) T-stress crack face traction term added and bug fixed.
- 4) Fix .frt file output for grow&merge.
- 5) Add option to turn off growth for specific crack fronts during grow&merge.

#### Changes to FRANC3D from Version 7.4.7 to 7.4.8

May 17, 2020

- 1) Fix kink angle computation where the “hold time” is set to FOREVER.
- 2) Fix y-axis format in XY plot dialog.
- 3) Set default local x and y vectors for command line crack insertion.

- 4) Fix ANSYS reader for /input data line.

#### Changes to FRANC3D from Version 7.4.6 to 7.4.7

Apr 14, 2020

- 1) Check for non-zero temperature during Save As... to set SIF computation parameters.
- 2) Change ANSYS volume meshing commands to bypass an ANSYS runtime error.
- 3) Check the Include File Path flag when writing the ABAQUS WriteDtpFile.py.
- 4) Fix bug when deleting load schedule events.
- 5) Fix bug in Fatigue Life plot when setting default plot type.
- 6) Reduce load event list text in Fatigue plot dialog.
- 7) Fix bug for SIFs along Path when exporting data for load steps with multiple substeps.
- 8) Fix bug in multi-XY plot – specifically for residual stress distributions.

#### Changes to FRANC3D from Version 7.4.5 to 7.4.6

Feb 19, 2020

- 1) Add support for transferring ANSYS node table data.
- 2) Improve search for closest point to Bezier surfaces.
- 3) Check for load amplitude change on a node within a \*step for ABAQUS.
- 4) Fix bug in ABAQUS .inp reader where there is blank space in the \*material type.
- 5) Add option to run checks on input FE mesh data when importing.
- 6) Fix SIF plot drop-downs for load substep when the number of substeps changes for a crack step.
- 7) Fix bug in XY axis plot formatting.
- 8) Fix multiple crack insertion command line output if rotation is not defined.
- 9) Fix mesh on/off check box for read and merge crack growth dialogs.
- 10) Add option to display crack surface geometry to crack growth dialogs.
- 11) Revised the fatigue cycle progress dialog to allow the user to cancel.
- 12) Fixed the fatigue dialog total cycles/time label.

#### Changes to FRANC3D from Version 7.4.4 to 7.4.5

Jan 8, 2020

- 1) Surface mapping of remeshed surfaces improved by passing surface normals when merging local+global model portions.
- 2) Add check for ANSYS uncracked doubled meshes.
- 3) Fix command language for ABAQUS extra contact (small sliding) and for default template radius for multiple flaw insertion.
- 4) Show all surface labels for extra connections for ABAQUS and ANSYS local+global connection.
- 5) Revise fatigue spectrum plot dialog to display reasonable x-axis values when zooming out.

- 6) Several bug fixes for cycle integration; specifically for the case when  $K_{max}$  is at or near  $K_c$  at one or a few points along the crack front.
- 7) Revised stopping criteria and related messages for cycle counting, and eliminated an 'abort' for the case of a user-specified single cycle.
- 8) Ortho/perspective view option added to Preferences.

#### Changes to FRANC3D from Version 7.4.3 to 7.4.4

Dec 5, 2019

- 1) Surface normals carried forward for ABAQUS coupled/constrained surface nodes to aid in correct transfer/mapping after remeshing.
- 2) ANSYS post-processing macro edited for crack face contact.
- 3) Contact pressure for multiple load steps (or substeps) correctly applied.
- 4) Extra option to anchor a crack at a node so that only translation occurs.
- 5) Crack geometry refinement level correctly retrieved from GUI.

#### Changes to FRANC3D from Version 7.4.2 to 7.4.3

Nov 15, 2019

- 1) Adjust tolerance for Jacobian determinant when mapping boundary conditions for the case where FE units are  $e-6$  or less.
- 2) Fix an issue displaying retained nodes for an edge or line of nodes.
- 3) Add support for ANSYS transient analyses
- 4) ANSYS constraint (CEINTF) MoveTol and Tol options added to dialog for local+global connections.
- 5) Fix InsertFileFlaw command to process modifications to flaw & template parameters from what is stored in the .crk file.
- 6) Fix bug in temperature conversion in fatigue life computations.
- 7) Fix bug when switching FE model units in fatigue life dialog.
- 8) Fix "stack overflow" in fatigue life dialog when counting cycles from multiple events.
- 9) Switch some "int" types to "long long" in fatigue life to prevent overflow.
- 10) Fix sleep time for MSWindows when waiting for RLM license after an analysis has finished.
- 11) Turned off crack front curvature correction for mode II with crack face traction (CFT) or pressure.
- 12) Fix bug in VCCT SIF computation with CFT or pressure.
- 13) Added button for plotting resolved SIFs to Advanced menu (this is not described in the documentation yet).
- 14) Fix equation display in the view response dialog.
- 15) Modified the Read Crack Growth dialog to support reading new front data for multiple crack fronts with the ability to not advance a front.
- 16) Add check box for crack front fitting to disable automatic updates to the extrapolation.
- 17) Add check box to apply crack front fit to all fronts for the case of multiple fronts.

18) Add button to local+global connection to turn on/off global set & surface labels.

#### Changes to FRANC3D from Version 7.4.1 to 7.4.2

Sept 23, 2019

- 1) Revise XY plots and equation format
- 2) Add check for local and global midside node ID mismatch when splitting FE data
- 3) Update to ABAQUS .rpt reader for element nodal stress
- 4) Update to ANSYS reader and postprocess script for modal analyses
- 5) Bug fix for ANSYS solid187 elements with missing node IDs
- 6) Revise path for SIF and fatigue plots when crack fronts split and/or disappear
- 7) Bug fix for case when closure flag is set in fatigue growth model
- 8) Bug fix in kink angle when Kmax and Kmin are swapped
- 9) Add plot tab for delta K threshold
- 10) Fix displayed model and result file name after Playback
- 11) Fix load step/schedule when adding crack face traction directly to auto-growth
- 12) Remove folder (path name) from external crack face traction files if same as work directory

#### Changes to FRANC3D from Version 7.4 to 7.4.1

Jul 30, 2019

- 1) Add preliminary timing output – you can request timing from the Preferences dialog
- 2) Fix a couple issues with ANSYS I/O; in particular, update load step for a change in omega when that is the only change in boundary conditions
- 3) Fix bug when computing SIFs for orthotropic materials using DC and VCCT methods
- 4) Fix GUI freezing after closing the Crack Front Plots dialog
- 5) Fix recording of lists of empty lists in session log
- 6) Check relative geometry patch size for multiple flaw insertion and set the refinement level if needed to make patch sizes consistent
- 7) Add analysis output type (full model, local model, template only) to session log

#### Changes to FRANC3D from Version 7.3.4 to 7.4

Jul 15, 2019

- 1) Add preliminary capabilities for computing elasto-plastic J-integral from ABAQUS results
- 2) Modified ABAQUS writeDtpFile.py script to extract data for elasto-plastic J-integral
- 3) Modified crack face traction (CFT) to allow user to add CFT to an existing load step and added options for setting temperature and thermal expansion properties for CFT in a new load step
- 4) Modified SIF XY Plot dialog to allow jpg or png export
- 5) Modified SIF XY Plot dialog to allow user to set axis scale and label
- 6) Modified SIF XY Plot to add extra legend for SIF computation options and terms

- 7) Color crack front edges for user-defined (bounding points and mesh) crack display
- 8) Process ANSYS shell (and 2D) elements along with 3D volume elements – shell elements sent to the GLOBAL model .cdb file
- 9) Fix some command language bugs and missing options for ANSYS – including the Python script and local+global connection settings
- 10) Allow for more than 99 ANSYS extra (.s##) load step files
- 11) Ignore unreferenced (not part of elements) nodes during crack insertion and remeshing
- 12) Fix GUI-related bug with temperature independent table-look-up crack growth models
- 13) Fix bug when writing crack growth model description text to file
- 14) Fix GUI-related bugs when displaying SIFs for multiple load steps and substeps
- 15) Add option to save .crk file during crack front merging
- 16) Fix crack insertion/meshing error messages
- 17) Fix bug finding mesh boundary facets when brick and tetrahedral elements are joined (without pyramids)
- 18) Process commas in quoted strings for ABSQUS inp data
- 19) Add preliminary capability for ANSYS static + modal combined analyses
- 20) Small change to point-in-region testing to improve crack front extrapolation.
- 21) Updated FOX library to the latest stable release
- 22) Updated RLM library to Version 13.
- 23) Updated internal license version – old license files will need to be updated.