|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Date: | 2016/03/02 | REF: | SB-RRR-CCC-NNN-YY V.0 | | |  |
| CONFIDENTIAL  NOT FOR PUBLIC USE | | |
| From:  Phone:  Loc.:  Email: | Ivor Clifford | To: | STARS | / | O. Zerkak  STARS\_TRACE | |
| cc: | STARS | / | C. Cozzo  M. Krack  H. Ferroukhi | |

Customization of XTV Graphics Output in TRACE v5.0

# Background

In the context of the recent KKL full-core LOCA and upcoming EPR and KKB full-core LOCA analyses, there is a need to reduce the size of output files produced by TRACE, while still providing useful information for post-processing LOCA analysis. For full-core models, the output produced by the NAMELIST options graphLevel="full", and graphLevel="limited" may be too large for effective post-processing since it contains many irrelevant variables.

This memorandum describes changes to TRACE for customizing the XTV graphics output on a case-by-case basis.

## TRACE Version

The code changes have been tested and modified for the following versions of TRACE: v5.0rc3, v5.0p3 and v5.0p4.

# Description of New Features

Two new NAMELIST variables have been added.

* The variable graphFilt receives a 1D array of character strings, containing a list of variable names (a filter list) for inclusion in the XTV graphics output. Note that these names apply to 1D, 2D and 3D dynamic variables only, i.e. global variables (e.g. time), control system variables (e.g. trip1000), scalar component variables (e.g. tpowo for HTSTRs, omegan for PUMPs), and static variables (e.g. vol) are unaffected by the filter list.
* The variable graphFltId receives a 1D array of integers, containing a list of component IDs to apply the filter list to.

Consider the sample NAMELIST input below:

&INOPTS  
 graphlevel="limited",  
 graphFilt="pn","alpn","tln","tvn",  
 graphFltId=10,20

&END

The behaviour of TRACE based on the input above is as follows:

* The “limited” graphics output is selected. This behaviour is unchanged from the original TRACE versions.
* For components 10 and 20, all limited output variables are first matched against the filter list before being added to the XTV graphics file. The result is that the XTV graphics output no longer contains variables such as vln, vvn, rlmf, rvmf, rmvm, etc. for components 10 and 20.

Some additional comments:

* The resulting XTV graphics file can be post-processed using AptPlot or other tool as before. The file simply contains fewer variables.
* If graphFltId is omitted or contains only zeros, the filter list is applied to all components in the model.
* If graphFilt is omitted or contains only empty strings, no filtering of the output is done.
* If a variable is not output by TRACE by default for the requested graphLevel, the variable will not be output if it is included in the filter list.
* Variable names in the filter list are case-sensitive and wildcards cannot be used. If there is an error in a variable name, it will simply be ignored and not written.
* A maximum to 64 variable names and component IDs can be supplied. This can be changed easily in the source code (see XtvCustomFilter.f90).

## Fixed Output Sets

To bypass the need to input long lists of variable names in graphFilt, a shortcut approach is available to obtain fixed output sets. These are controlled through the graphLevel NAMELIST variable. The current implementation supports graphLevel="userLOCA", which has the following effect:

* The graphLevel is changed to “full”.
* graphFilt is assigned a fixed set of variable names. The actual filter list that is assigned is echoed in the TRACE output and message files.

Additional output sets can easily be added in the source code (see XtvCustomFilter.f90).

# Implementation

The functionality described in Section 2 is implemented as a new Fortran 90 module (XtvCustomFilter.f90) with minor changes to four TRACE source code files (NamlistDatM.f90, NamlistInputM.f90, NamlistM.f90, XtvSetupM.f90). The basic approach followed is to filter the inclusion of dynamic variables in the XTV graphics file by a call to ApplyXtvFilter (module XtvCustomFilter) from the subroutines AddVectorR1Var, AddVectorI1Var, AddVectorR2Var, AddVectorR3Var, AddVectorI3Var (module XtvSetup).

The fixed output sets are handled through a call to InitCustomGraphLevel (module XtvCustomFilter) from subroutine namlst (module Namlist).

Additional changes are primarily for the inclusion of the 2 additional NAMELIST variables, but also include minor bug-fixes for handling NAMELIST variables containing integer lists.

## Distribution

The source code changes are distributed as three separate patch files, one for each version of TRACE. The patches may be applied using the Linux patch command, for example:

patch –p1 < trace\_5.0p3\_customizeXTV.patch

# Non-Regression Testing

A single non-regression test was run for TRACE v5.0p4 using the Westinghouse 3 loop model, which is distributed with the official TRACE release. This is a steady-state and transient restart case. The only differences between the resulting text output files are due to minor differences in CPU timing for the simulations. Otherwise, the simulation results are identical. The resulting XTV graphics file is filtered as expected.