

The RETRAN & VIPRE Newsletter



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RETRAN-3D Work Summary for 2010

A summary of RETRAN-3D related activities for 2010 is given below

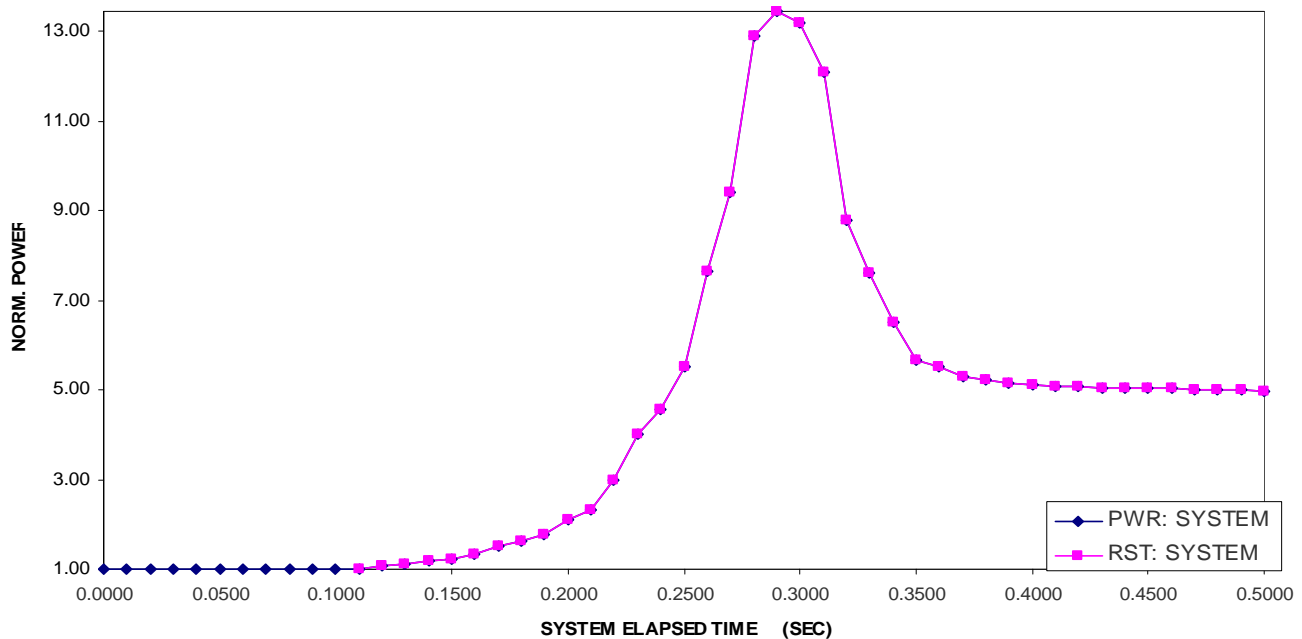
3-D-Kinetics RESTART

While restart has never been functional for any version of RETRAN-3D running 3-D kinetics, it is a necessary feature since many 3-D kinetics cases can take a long time to run. To improve the usefulness of the 3-D kinetics option, restart capability has been added. This allows users to continue (restart) 3-D kinetics cases, which terminate intentionally or unintentionally before the required solution period is complete. Restart problems continue a terminated problem solution from the original

problem data stored in the restart file, which can save valuable time and resources.

The standard PWR 3-D Kinetics Sample Problem was used to test the functionality of RESTRT saving a restart file with the sample problem run. A RESTRT was then run by restarting partway through the original solution using the time-step, trip, and minor edits from the original RETRAN-3D run. No changes were made to boundary conditions or control actions.

The results shown below illustrate that the RESTRT results (restarted at 0.1 seconds), are essentially identical



RESTRT and RETRAN Results Comparison for the PWR Sample Problem

RETRAN-3D Work Summary for 2010 (Cont'd)

to the original results between 0.1 and 0.5 seconds. Similar agreement was obtained for the other 3-D kinetics sample problems.

Improved RETRAN-3D INPUT Processing Error Messages

As input is processed within RETRAN-3D, various routines examine the input to insure that it is formatted correctly, that all required data is supplied, and that the input values are consistent with physical and known limits. While RETRAN-3D writes an error message(s) when an error is encountered, the messages are often terse and in some instances misleading. There is no guidance as to how to correct the error.

Several years ago, the error messages associated with the transient solution were revised. The error messages were revised to aid code users (many of the original error messages contained information that was only useful to a programmer). An appendix in the User's Manual – Volume 3, contains a detailed description of the error, possible causes and recommended action to eliminate the error.

The recent effort has revised the input processing error messages to use a similar error handling scheme or process where the error messages are written to the output file and **errlog** files are processed and edited as they occurred. The input processing error messages have been grouped by category and each is assigned a unique error message. The errors are categorized according to component type or specific model option.

The messages have been revised to be more informative to the code user. An attempt has been made to eliminate and/or revise confusing messages. Each message has a more detailed description in Appendix C of the User's Manual which includes a discussion of specific action that can be taken to eliminate the error.

Short Form Problem Description Data Replacement Cards

The input for the Problem Control and Description Data Card 01000Y was revised at MOD004.1 to allow a short form that removed all dimensions and many option flags from the card series. A maximum of 12 data items are supplied on the new form compared with the 42 that were originally allowed. Use of the short form input simplifies use of the code and avoids many commonly encountered errors associated with adding or removing a component or minor edit and not changing the corresponding input on the 01000Y data card.

While the option has been available for some time, many users' models still use the classic form of input where up to 42 variables are defined. To simplify migration to the short form, a new output edit was added to the output file

immediately following the edit for the problem control and description data. The edit includes the replacement cards required to convert the deck to use the short form of the problem control and description data. The replacement cards can simply be copied into the clipboard and pasted at the end of the RETRAN-3D input deck.

RETRAN-3D Trouble Report Resolution

Thirty-five trouble reports have been filed since the release of MOD004.5f95. Three trouble reports were still unresolved when MOD004.5f95 was released. All 38 trouble reports have been resolved and will be included in MOD004.6f85.

64-Bit RETRAN-3D Windows 7 Application

The Windows version of RETRAN-3D MOD004.5f95 was released as a 32-bit application, which should run on both 32- and 64-bit processors. However, it included license control software that used a 16-bit dll, which does not function on 64-bit machines. When the 32-bit RETRAN-3D application is run on a 64-bit machine, the following error message is issued "Cannot execute machnm1.exe!". For most organizations the error does not affect execution of RETRAN-3D other than the fact that a response is required to clear the message, after which the code runs normally. If an automated procedure is being used to run multiple cases, it will require a response for each case. This error would be fatal for organizations whose license locks the RETRAN-3D installation to a particular computer, but none have reported the problem.

The Protection Plus (PP) license control software used with RETRAN-3D MOD004.5f95 required upgrading for use with 64-bit installations on Windows 7. This required revisions to C++ functions used to implement the licensing features, including the new PP model for uniquely identifying hardware platforms. The revised code supports use of a license file to uniquely identify and validate organizations licensed to use RETRAN-3D. Various types of license restriction models need to be supported. They include (1) licenses where no restrictions are made for installation hardware or expiration, (2) licenses where the executable is locked to a particular computer, (3) licenses that are give an expiration date after which the installation will not run, and (4) and combination of 2 and 3.

Both 32-bit and 64-bit implementations of the C++ interface libraries were tested and are now available for use with the next release of RETRAN-3D.

During the implementation of the revisions for the 32- and 64-bit locked RETRAN-3D applications, the Intel Fortran compiler was successfully migrated from Version 10.1 to Version 11.1. This compiler version will be used for new releases of the Windows and Linux code versions.

RETRAN-3D Work Summary for 2010 (Cont'd)

RETRAN-3D MOD004.6 Code Version

A new RETRAN-3D code version will be released soon. It will include the error corrections and code modifications described above. The release will support the HPUX, AIX, and Solaris, Red Hat Linux and Windows XP or 7 platforms. Both 32-bit and 64-bit applications will be provided for the Windows installation. They will also employ software locking similar to previous releases.

Two transmittal CD-ROM formats will be available, one for Windows only installations that does not include source code and a second for UNIX/Linux platforms with executable files and source code. It also includes the PC application installation. All four volumes of the documentation will be updated for the new version. See the discussion below for the update of Volume 4.

Assessment Manual - Volume 4 Analyses

During RETRAN-3D development and maintenance efforts, verification and validation is used to make certain the software satisfactorily performs all intended functions. As RETRAN-3D was developed, the analyses included in the Assessment Manual – Volume 4 were run in support of the validation effort. Since that effort was an ongoing work, several different code versions were used to produce the results. Initially versions MOD001f and MOD002 were used. Some analyses were re-run with later versions, primarily MOD003 but MOD003.1 for a few.

As part of the MOD004.5f95 validation effort, 13 separate effects analyses and 35 system effects analyses form the Assessment Manual were used to validate the Fortran 95 conversion effort. This effort required revising the input for the new code version and it also discovered some errors that had to be corrected before the analyses could be completed. They were valuable in validating the code.

As a result of this validation effort, it became apparent that the analyses presented in the Assessment Manual needed to be updated using the current code version. This effort would insure that the validation problems could be run on the current code version and that the results presented are true representations of the solution from the current code.

All of the Assessment Manual cases for which CSA has input decks have been re-run. Some of the decks in the Assessment Manual are not available because the analyses were performed by organizations that participated in the original validation of RETRAN-3D and the decks were not provided to CSA. This was an extensive effort that involved running 177 validation cases representing a wide combination of individual models, components, and numerical techniques. All of these

cases have been re-run using MOD004.5f95 with various error corrections for some of the analyses. As soon as MOD004.6f95 is released, they will be re-run on this code version. These results will then be plotted against the experimental data and other code results as necessary. The update plots will be included in the Assessment Manual.



The result of this effort will be an Assessment Manual where most of the results are representative of the current code. The results that cannot be rerun due to the lack of an input deck will be retained in the manual and the code version on which they were run will be identified. Efforts will be made in the future to locate the decks and update the results.

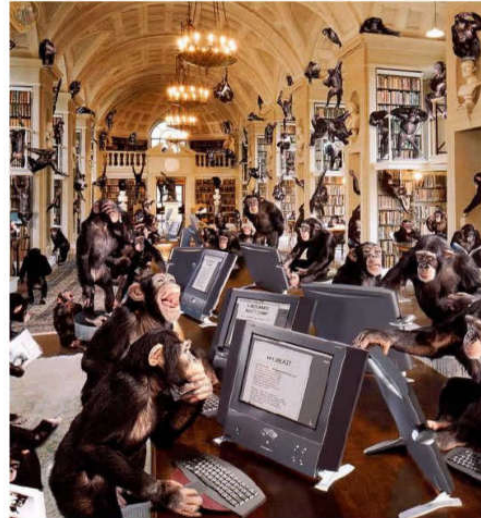
As part of this effort, procedures have been developed to simplify re-running the validation cases on a new code version.



get_R3D_Plot_Vars Utility Program

RETRAN-3D MOD004.5f95 contains a new feature to optionally create an output file named **R3D_PLOT** that can be used to provide solution results to plotting or post-processing applications. It is described in Section IV.2.8 of the Programmer's Manual – Volume 2. A utility program, **get_R3D_Plot_Vars**, has been developed to allow solution results to be extracted from the **R3D_PLOT** file. The information to be extracted is requested using minor edit variable request pairs (variable flag and region number) and the format of the new output file is user defined. An option allows **get_R3D_Plot_Vars** to create an auxiliary file (TAPE60). Appendix E of the Programmer's Manual – Volume 2, describes the use of the **get_R3D_Plot_Vars** utility program. The source code for the utility is provided with the transmittal package.

Our tech department is hard at work solving your computer problems.



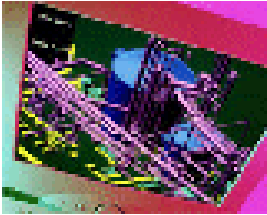
Possible RETRAN Development Activities for 2011

A list of development activities have been sent to the RUG members, with a request for additional suggestions if there is something they would like to see done that is not on the current list. Responses will be added to the full list, which will be prioritized by the RUG Steering Committee. Items of interest from prior years included:

- New User Features
 - Continue Preparation of a RETRAN-3D User Guidelines Document
 - Add Enhanced Steady-State Error Messages and Corrective Action
 - Add New Control Elements
 - Add New Minor Edit Variables and/or User-Supplied Minor Edit Labels
- Solution Enhancements
 - Implement a Volume versus Height Model for Separated Volumes
 - Develop a Pressurizer Thermal Stratification Model
 - Implement a Water Packing Mitigation
 - Implement a Taitel-Dukler Flow Regime Map for Dynamic Slip
 - Design and Implement a VIPRE-Based 3-D Core Model
 - Develop and Implement a Six-Equation Model
- New Validation Analyses
 - Five-Equation Studies for Cold Water Injection into Two-Phase Fluid
 - RETRAN-3D SBLOCA Benchmark to Test Facility Data

2011 RVUG Membership Fees

RVUG membership fees for 2011 were set by the Steering Committee. Their decision was to keep the fees at the 2010 level rather than increasing them by 3% as had been done the past few years. Membership notices were sent to past members in December of 2010.



RETRAN User Interface, Version 2.5.0 Coming April 2011

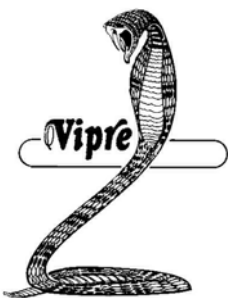
CSA periodically updates the RETRANUI to resolve trouble reports and provide user requested enhancements. Version 2.5.0 is a new release of the RETRANUI that contains new features and error corrections. New features and enhancements for Version 2.5.0 are summarized below.

New Features and Enhancements

- Added a new Stop button to the toolbar. When pressed, it results in the problem being terminated as if an end problem trip were encountered and all edits and auxiliary files are closed normally.
- Compatible with Windows 7 and Excel 2007.
- When using change decks, the output files are now saved in the change deck directory instead of the input file directory.
- When setting up an executable file, you now have the ability to type in or select the executable location and the local temporary files directory.
- Added REEDIT and GENRST to tape60 file types.
- Added the capability to connect to a remote UNIX/Linux machine using either a REXEC or SSH connection.
- Extended FTP functionality to include the use of SSL connections.

The RETRANUI Version 2.5.0 User's Guide has been updated to include descriptions and instructions on how to use the new features.

Version 2.5.0 of the RETRANUI is available to organizations that have purchased an annual maintenance subscription. Subscriptions include software updates and telephone or e-mail support for one year. Organizations purchasing the RETRANUI receive a subscription to the maintenance group for one year from the purchase date, after which an annual membership may be purchased. The annual fees provide support and funds for additional RETRANUI development.



Possible VIPRE Development Activities for 2011

A list of development tasks has been sent to the VUG members, with a request for additional suggestions if there is something they would like to see done that is not on the current list. All responses have been

received. Responses will be added to the full list, which will be prioritized by the VUG Steering Committee. Items of interest from prior years included:

- VIPRE-01 Benchmark Based on NUPEC PWR Subchannel Bundle Test (PSBT)
- MDNBR Search Improvement
- Improve Input Error Messages
- Review SI Options Conversion
- Multiple Case Options - External File for Power Data
- Revised VIPRE-01 Programmer's Manual

If you do not have access to the detailed task descriptions, please contact Garry Gose, gcg@csai.com.

New VIPRE-01 Code Transmittal MOD02.4F95 Released February 2011

A new VIPRE-01 code transmittal has been developed and sent to RUG members during February 2011. VIPRE-01 MOD02.4F95 is the most recent VIPRE-01 MOD02 code version to be issued to the VIPRE User Group.

VIPRE-01 MOD02.4F95 is the result of a VUG funded multi-year project that modernizes the VIPRE-01 source code and data storage using up-to-date Fortran language constructs. VIPRE-01 MOD02.4F95 also contains corrections for trouble reports and VUG requested enhancements.



Here are some of the significant new features of VIPRE-01 MOD02.4F95:

- Dynamic or execution time data array allocation. This should significantly reduce (or eliminate the need for recompiling the code as new options or more detailed input models are developed.
- Another benefit of the dynamic memory allocation project is a significant reduction in the restart file size.

- New CHF correlations can be developed using a dynamic link library (DLL) feature as a way to add third party, proprietary correlations to VIPRE-01 without recompiling the VIPRE-01 source.



- VIPRE-01 run-time errors are categorized and summarized in a post-execution error summary file. Information is given about the type of error and location in the model. User guidelines are written that describes the error, the probable cause, and potential user action.
- An optional drift flux option based on the RETRAN-3D implementation of the Chexal-Lellouche drift flux model has been added.
- Code modifications that correct ten VIPRE-01 trouble reports have been added. The trouble reports were filed since the release of VIPRE-01 MOD02.3 (September 2007).

The formal code transmittal of VIPRE-01 MOD02.4F95 is a CDROM consisting of source, documentation, test cases, and installation. VIPRE-01 MOD02.4F95 is supported Windows XP/VISTA/7, IBM, SUN, and HP UNIX platforms and PC compatible machines operating under Linux.

For more information regarding VIPRE-01 MOD02.4F95 contact:

Garry C. Gose
(208) 529-1700, Ext. 22, or gcg@csai.com

RETRAN Visualization Tool

A preliminary version of the RETRAN Visualization Tool (RVT) was unveiled at the May 2010 RUG meeting as a “work in progress.” Based on the feedback, the RVT scope was expanded to include a plant view that displays various regions as different colors and shades along with dials, gauges, recorders, digital channels, and other indicators for displaying data. Hence its release has been delayed, but is now nearing completion. An online demonstration will be available soon. An updated description of the RVT can be found at <http://www.csai.com/rvt/index.html>.

About This Newsletter

RETRAN/VIPRE Maintenance Programs

The RETRAN/VIPRE Maintenance Programs provide support of software developed and maintained by CSA. The main features of the maintenance programs include:

- the code maintenance activities for reporting and resolving possible code errors,
- providing information to users through the User Group Meetings and this newsletter, and
- preparing new versions of RETRAN and VIPRE.

The RETRAN and VIPRE Maintenance Program both have 15 organizations participating, including 11 U.S. utilities and four organizations from outside of the U.S. A Steering Committee, composed of representatives from the participating organizations, advises CSA on various activities including possible enhancements for the codes and the scheduling of future code releases. Information regarding the Maintenance Program can be obtained from:

Mark P. Paulsen or Garry C. Gose
CSA Inc.
P. O. Box 51596
Idaho Falls, ID 83405
paulsen@csai.com or gcg@csai.com
(208) 529-1700

Newsletter Contributions

The RETRAN/VIPRE Newsletter is published for members of the Maintenance Program. We want to use the newsletter as a means of communication, not only from CSA to the code users, but also between code users. If this concept is to be successful, contributions are needed from the code users. We would like to include a brief summary of your RETRAN and VIPRE activities on the next newsletter. Please provide your contribution to CSA, P. O. Box 51596, Idaho Falls, ID 83405, or to one of the email addresses below by December 9, 2011. We are looking forward to hearing from all RETRAN and VIPRE licensees.

Mark Paulsen	paulsen@csai.com
Garry Gose	gcg@csai.com
Pam Richardson	pam@csai.com

The RETRAN web page is located at

<http://www.csai.com/retran/summary.html>.

The VIPRE web page is located at

<http://www.csai.com/vipre/summary.html>

Previous issues of the RETRAN/VIPRE Newsletter are available from the RETRAN or VIPRE web pages.

Steering Committee Members

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Kurt Flaig, Dominion, Kurt_Flaig@dom.com
Jeff Abbott, Duke Energy, jlabott@duke-energy.com
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Tsutomu Ikeno, NFI, t-ikeno@nfi.co.jp
Daren Chang, STPEGS, dchang@stpegs.com

Calendar of Events

User Group Meeting
May 24 & 25, 2011
Salt Lake City, Utah
<http://www.csai.com/retran/rvug/ugm.html>

Basic RETRAN Training Session
June 13-17, 2011
Idaho Falls, Idaho
<http://www.csai.com/retran/summary.html>