Overview

There 7 regions to the user interface:

- **Simulation Control Block** – Simple simulation and replay controls.
- **Data Selection Block** – Select data for either plotting or database display.
- **Plot** – Data trace display.
- **Stability Plots** – Bode and other plots
- **Initial Conditions** – Table for review and modification of simulation initial conditions.
- **Database** – Data table display of selected data.
- **Menu bar** – Printing, data display options, and help Information.

Simulation Control Block

The Simulation Control Block allows the user to select from two primary modes of operation: Live or Replay modes. Buttons for selecting these modes of operation are located in the lower right corner of the Simulation Control Block. In live simulation mode the user sets the maximum time of simulation and clicks the Execute button. The model starts with a default time step. If a failure occurs, the time step will be reduced by a factor of 2 and restarted until a successful simulation is performed. A maximum of 3 retries is allowed.

The initial execution of a simulation will plot a selected set of variables, as described in the following section. Different sets of variables may then be selected for either database display or plotting, using the controls of the Data Selection Block. A live simulation may be paused and continued, or aborted, but these controls are not available during subsequent plot operations on additional variable sets, or in replay mode. Clicking the Execute button will always result in a new live simulation, and so, this is not the most efficient way to plot additional variables. While a calculation is executing "RUNNING…" will flash above the Maximum Time edit box; when a calculation finishes, "Done" will be displayed above the Execute button.

Click the Save Simulation button to save a simulation, if desired, at the end of a run. A dialog will open allowing user specification of a file name. Just enter an appropriately descriptive phrase. Spaces will be replaced with underscores and .bin will be appended, if not entered by the user. Click OK or hit the Enter key to accept the file name and save the file. Clicking the X button in the upper right corner of the dialog will cancel the process and the file will not be saved, but can still be saved if the Save Simulation button is clicked again. Either clicking the Execute button or switching to Replay mode will destroy an unsaved simulation file.

In Replay mode select a saved simulation file from the Replay List. The maximum simulation time from that run will be displayed, but the maximum simulation time may not be modified. Execute, Pause, Continue, and Abort functions are not available in Replay mode. Use the controls of the Data Selection block to plot or display selected variable sets.

Data Selection Block

There are two modes here: Plot Groups (the default) and All Data (see the Menu Bar section below for instructions on choosing between theses modes). In Plot Groups mode, the desired Plot group is selected from a list, causing a variable set to plot to be displayed in a second list. You can reduce the number of variables in the selected list by double clicking on items to be removed. Click Plot to plot the selected variables. Plot scaling controls are also in the Data Selection block. Turn on Auto Scale mode by clicking the Auto Scale button and the plot will scale to the data as it arrives. Auto Scale mode does not affect data displayed prior to the mode being set. A dialog to set specific scale values is also available – just click "Scale…". A dialog will open that allows setting X and Y scale values, including Minimum, Maximum, Label and Major Grid interval sizes. Some simulations may take some time to execute, and continually updating the plot can be a significant factor; checking the "Delay Plot" check box before the start of a simulation will prevent the plot from being displayed until the simulation is done. Click OK to accept new values and redisplay plot, or the X button to cancel.

The Data Selection Block also controls display of data in the database table. After selecting a Plot Group as for plotting, click the Data button, and data will be displayed in the database. The Plot and Data buttons are independent such that a set of variables may be displayed in the table without affecting what data are plotted, and vice versa. The amount of data to be displayed can be controlled. Frequently, only the final data may be interest, or if some time history of data is desired, every data record may be too much to deal with. The slider control above the Data button may be pushed to the right to get only the final data record, to the left to get all data records, or to an intermediate setting to filter the data records by increasing powers of ten (display every tenth record, every hundredth record, every thousandth record …). After moving the slider, click Data to redisplay the table. Click the CSV button to dump the data to a comma separated value file, instead of to the database table.

Some Plot Groups may contain data only suitable for display in the data table. Typically, data that are calculated but have constant or near constant values would be considered unsuitable for plotting; however, it is still valuable to look at such data in a data table. Thus, although all Plot Groups are in the selection list, some may not allow plotting, and an error message will indicate this situation if the user attempts to plot them.

In All Data mode the controls are about the same, but the first list shows all individual variables. Because there are a lot of these variables, a filter string can be entered to reduce the number of variables shown for selection. Selected individual variables are put in the second list, for display. Use the "Clear" button to clear the "Variables to Plot" list, or double click on an item to remove only that item. All Data mode is useful for advanced users, but requires deeper knowledge of the model to effectively use. All Data mode is not subject to restrictions on plotting – that is, every variable may be plotted in All Data mode, even if the Plot Group to which an item belongs does not allow for plotting.

Plot

The plot is used to display selected data traces, as discussed in the preceding section. As mentioned above, its scale can be controlled. The plotting routine examines the data and puts out more detail when needed, and less data when it can to speed things up. The plot can be printed as well, from File Menu. Options for Page Setup, Print Preview and Printing are available. Plots are best printed in

landscape mode; use Page Setup to select landscape or portrait. The plot swaps some properties prior to printing, for readability (white background and a few other details).

Clicking anywhere in the plot will produce a red vertical line at the time value clicked on. This line is the data synchronization cursor. The data record closest to the selected time value will displayed at the center of the database table, highlighted. The cursor line time location will also be adjusted to exactly match the time of the located data record. The left and right keyboard arrow keys will move the cursor line and highlight the appropriate data record.

Stability Plots

This section displays Bode Phase, Bode Amplitude and Stability plots for the model. The plots require simulation data; either execute a new simulation or open a saved replay file. The stability plots use the final data record for certain values and expect that this data represents steady state. The "Scale…" may be used to adjust the X and Y scale values of the stability plots, the X range of the plot data (independent axis), and the use of log or linear scale on the X axis.

Initial Conditions

The simulation default initial conditions values are displayed in a tab control with possibly multiple tabs. The categories of initial conditions are defined by a given model but the following are common: Physical Parameters, Core Configuration, Reactivity Parameters and Operational parameters. Descriptive names, values and units of measure are displayed. Initial condition values, but not names or units, may be changed. Click the Defaults button to reset all parameters to their default values. Click the "IC Set Options…" button to save the current initial condition values or to reload a previously stored set.

As discussed in the Menu Bar section below, the Initial Conditions tables and the Database table may be swapped with each other – only one is visible at any given time.

Database

The database table is used to display data for selected variables. Data to be displayed is independent of the data plotted. As discussed in the plot section above, a synchronization cursor can be used to relate data records to plot time. By using the Ctrl-a (select all data) and Ctrl-c (copy data) key combinations, data can be copied and pasted (Ctrl-v) to an analysis package such as Excel. Copy large amounts of data (several MB or more) may cause a memory exception; if this occurs click the "Continue" button in the error dialog. You may proceed by selecting less data and trying Ctrl-C again, or by clicking the "CSV" button to dump the currently selected data to a CSV file. As discussed in the Menu Bar section below, the Initial Conditions tables and the Database table may be swapped with each other – only one is visible at any given time.

Menu Bar

There are four primary menus:

- File – Plot printing options (operate on currently display plot or plots)
  - Page Setup – landscape / portrait the most useful options here
  - Print Preview – opens a print preview dialog
  - Print - opens print dialog
- Data – All Data or Plot Group modes
- View – Swap Initial Conditions and Database displays, or switch between Data or Stability plots
- Help – Display this help file or the About Dialog.

For further help, or if you experience any problems, contact: determan@lanl.gov, 505-665-1914.