Temperature Characteristic Analysis Procedure of the ASSA through EQ Data Comparative Method

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1. Introduction

The circuit simulation analysis and diagnosis methods are used to assess instruments in detail when they give apparently abnormal readings [1-4]. A new simulator, ASSA(abnormal signal simulator analysis), through an analysis of the important circuits modeling under severe accident conditions has been designed. It has three main functions which are a signal processing tool, an accident management tool, and an additional guide from the initial screen. In this paper, it can be simulated to the temperature characteristic analysis procedure of the ASSA through EQ data comparative method and using specific signal processing under severe accident condition. The temperature range for simulation is from 27 degrees Celsius to 800 degrees Celsius for resistance as well as capacitance form the ASSA equivalent circuit that is 4~20mA

2. Operation Step of the Circuit Simulation and Temperature Measurement Methods

2.1 Operation Step of the ASSA

When an instrument which is providing information for managing a severe accident is apparently malfunctioning, a series of steps can be taken which include a direct diagnosis of the instrument and an indirect method of determining the value of the parameter. These methods are identified by eleven step processes and five of the steps are called operational aids. They are combinations of diagnostic actions and other means of a measurement. These can be applied when instrument readouts are suspectful or faulty. The five types of aids are the diverse indication, parameter inference, portable instrument, circuit diagnosis, and the portable circuit readout. Figure 1 shows a main menu for the ASSA
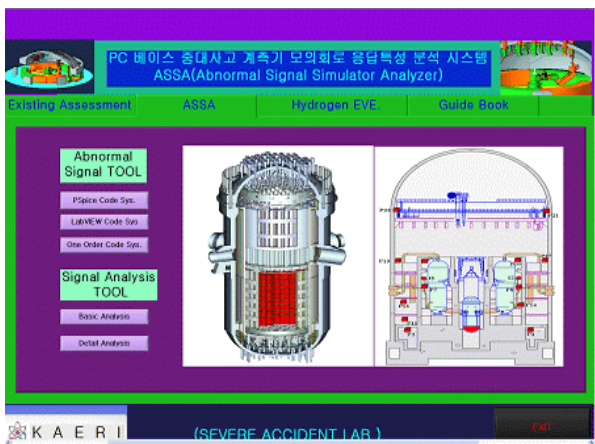

Fig. 1 Main menu for the ASSA

2.2 Operation Step of the Circuit Simulator

It has three main functions which are a signal processing tool, an accident management tool, and an additional guide from the initial screen. The signal processing tools have the main positions information obtained from 5 areas in the containment building which include the information needs of the instruments, and the circumstance parameters from the accidents class. As the next step, we need the decision making from some signals which means three kinds of signal patterns, of which the first one is normal condition signals, the second one is abnormal signals, and the third one is out of control signals. In the case of abnormal signals, they have to be processed by five steps and finally they can be shown on a CRT screen with enhanced signals. There are two codes to be used, the designed simulator which is composed of the LabVIEW code as a main tool and the PSpice code file as an engine tool which should be exported to the LabVIEW code file. Figure 2 shows Operation step for assessment of existing instrument of the simulator.
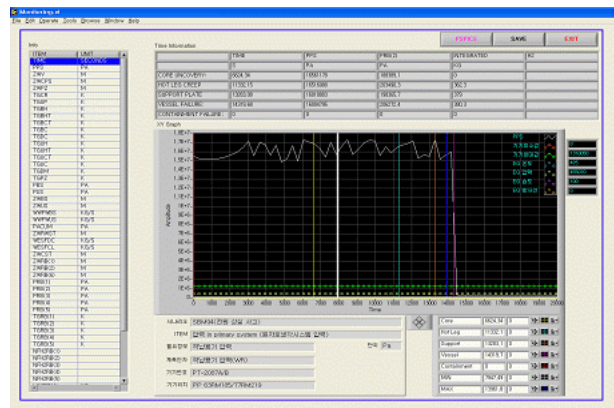

Fig. 2 Operation step for assessment of existing instrument of the simulator

3. Temperature simulation

To set the temperature to specify the temperature or list of temperatures at which all analyses are performed. The temperatures are in degrees centigrade. If more than one temperature is given, then all analyses are done for each temperature. We can type either a single value for the temperature box, or a list of temperatures. When a list is typed, the circuit is simulated multiple times, once for each temperature in the list. Running an analysis at multiple temperatures can also be done as a parametric analysis. With parametric analysis, the temperatures can be specified either by list or by range and increments within the range. The temperature range for simulation is from 27 degrees celsius to 800 degrees celsius for the resistance as well as capacitance

form the ASSA equivalent circuit that is 4~20mA. Figure 3 represents the 3 output temperature signal patterns to be run from ASSA .
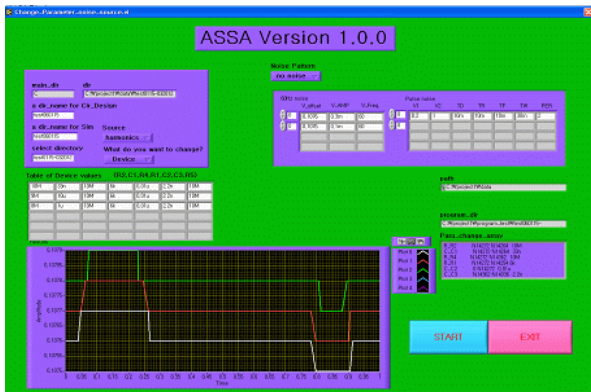

Fig.3 3 output temperature signal patterns to be run from ASSA.

3.1 The statistical Temperature Analyses

The statistical analyses perform multiple runs, as does the temperature analysis when a temperature range is typed. Conceptually, the monte carlo and worst case loops are inside the temperature loop. However, since both temperature and tolerances effect the model parameters, the interaction of the two can become complicated. Therefore, it is recommended that we should not use the temperature analysis option to sweep multiple temperatures when using monte carlo or worst case analyses in a circuit. For the same reason, sweeping the temperature with a DC sweep analysis while performing one of these statistical analyses is not recommend. In addition, putting tolerances on temperature coefficients is not recommended.

3.2 Procedure to set the temperature

▸ In the simulation settings dialog box, click the analysis tab.

▸ From the analysis type list, select a basic analysis type.

▸ From the options list, select temperature (sweep).

▸ Choose one of the following:

a. Run the simulation at temperature, to run the simulation at a constant temperature, and then enter a value in the text box.

b. Repeat the simulation for each of the temperatures, to repeat the simulation at different temperatures. Type a list of temperatures in the text box.

4. Performance Analysis

Performance analysis allows to be add traces that show how a derived value changes between simulation runs. The derived value is calculated for each run based on the measurement expression. To prepare for using performance analysis, it has multiple sections of data in the probe data file. It can be also

appended data files together in PSpice A/D, which will treat them as separate sections. Enabling a parametric analysis, a temperature analysis with multiple temperatures, or a monte carlo analysis causes the simulator to do multiple simulations of the circuit. It can be created measurement definitions we want to use and bring them into PSpice A/D. Figure 4 shows 2 channels each signal from circuit simulator
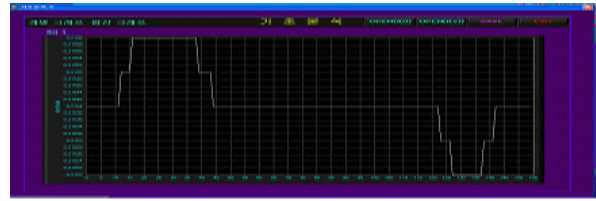
(a) Output Time domain signal

(b) Output Frequency domain signal

Fig. 4 Out-put signals on 2 channels each signal from circuit simulator

5. Summary and Conclusions

In this paper, we provided a operating step of the ASSA and showed how a circuit evaluation fits into the process as operating requirements and functions. To set the temperature to specify the temperature or list of temperatures at which all analyses are performed. The temperatures are in degrees centigrade. If more than one temperature is given, then all analyses are done for each temperature. Using the results, a simulator can also be developed by the diagnosis logic in the severe conditions.

ACKNOWLEDGEMENT

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