Chapter 5

Conclusions and suggestions

This ECCS simulation is a stand alone simulation which can only implement for analyzing the large break near RIH1 according to the method used to created the network modeling. In this model, it is found that the calculation results from network solver, such as pressure and flowrate in ECCS are consistent with the values from design data of initial condition in normal operation and for recirculation mode in recovery phase. The deviation of these result values is less than 10% from design data. But after the break is postulated, coolant conditions in the channels change from single phase flow to two phase flow, which network solver can not implement for this case. The results have a great deviation from AECL's simulation.

Comparing to the major event sequences from AECL's simulation data, the results are about 10% to 20% deviation. Nevertheless, for monitoring and operating the simulation, the interface of the calculation engine and user interface screens performs very well in real time mode.

Further works to observe the fuel sheath temperature in the core are done here. Using one dimensional, six delayed neutron groups, it is found that the highest fuel sheath temperature at the broken loop is approximately 937 °c which is less than the maximum cladding temperature for zirconium at 1204 °c.

Because the fuel sheath temperature decreased rapidly from 937 °c to 350 °c immediately after the water was injected into the PHT system by ECCS.

Suggestions

1. Heat transfer coefficient of the water during the large break should be studied, because this parameter has a great effect on the capacity of the coolant to remove the decay heat from the core.
2. Like heat transfer coefficient, the higher the temperature in the reactor increases, the higher the coolant density decreases. The relationship between the temperature and coolant density should be studied.
3. The hydraulic network code, using in this model, is used only for single phase flow. But, in this case, as soon as the break occurs, the bubbles will form in the fuel channels leading to two phase flow in the system. Thus, to use this simulation for the purpose of safety analysis, hydraulic network code for two phase flow should be developed.